

AIRS
Atmospheric Infrared Sounder

AIRS Version 2.7 Released Files Description



March 2003
Version 1.1



Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

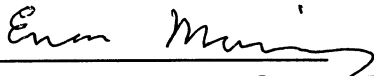
JPL D-25819

This page intentionally left blank.

AIRS
Atmospheric Infrared Sounder

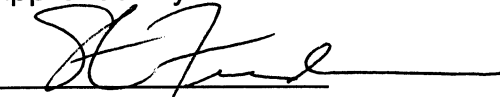
AIRS Version 2.7 Released Files Description

Prepared By:



Evan M. Manning, System Engineer
AIRS Science Processing System

Approved By:



Steven Z. Friedman, Project Element Manager
AIRS Science Processing System



Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

JPL D-25819

This page intentionally left blank.

Document Change Log

Date	Version Number	Reason for Change
February 2003	Initial Release	
March 2003	1.1	Updated product interface specifications to Version 2.7.12.0. Revised Appendix B.

This page intentionally left blank.

CONTENTS

1	INTRODUCTION.....	1
1.1	PURPOSE.....	1
1.2	APPLICABLE DOCUMENTS.....	1
1.3	ACRONYMNS	2
	APPENDIX A. PRODUCT INTERFACE SPECIFICATIONS.....	5
A-1.	L1B AIRS SCIENCE INTERFACE SPECIFICATION.....	5
	<i>Dimensions</i>	5
	<i>Geolocation Fields</i>	5
	<i>Attributes</i>	6
	<i>Along-Track Data Fields</i>	10
	<i>Full Swath Data Fields</i>	11
	<i>Special AIRS Types</i>	13
A-2.	L1B AIRS QA INTERFACE SPECIFICATION.....	15
	<i>Dimensions</i>	15
	<i>Geolocation Fields</i>	15
	<i>Attributes</i>	15
	<i>Along-Track Data Fields</i>	20
	<i>Full Swath Data Fields</i>	21
	<i>Special AIRS Types</i>	23
A-3.	L1B VISIBLE/NIR SCIENCE INTERFACE SPECIFICATION.....	25
	<i>Dimensions</i>	25
	<i>Geolocation Fields</i>	25
	<i>Attributes</i>	25
	<i>Along-Track Data Fields</i>	29
	<i>Full Swath Data Fields</i>	30
	<i>Special AIRS Types</i>	31
A-4.	L1B VISIBLE/NIR QA INTERFACE SPECIFICATION.....	33
	<i>Dimensions</i>	33
	<i>Geolocation Fields</i>	33
	<i>Attributes</i>	33
	<i>Along-Track Data Fields</i>	37
	<i>Full Swath Data Fields</i>	38
	<i>Special AIRS Types</i>	39
A-5.	L1B AMSU-A SCIENCE INTERFACE SPECIFICATION	41
	<i>Dimensions</i>	41
	<i>Geolocation Fields</i>	41
	<i>Attributes</i>	41
	<i>Along-Track Data Fields</i>	44
	<i>Full Swath Data Fields</i>	46
	<i>Special AIRS Types</i>	47
A-6.	L1B HSB SCIENCE INTERFACE SPECIFICATION.....	49
	<i>Dimensions</i>	49
	<i>Geolocation Fields</i>	49

<i>Attributes</i>	49
<i>Along-Track Data Fields</i>	52
<i>Full Swath Data Fields</i>	53
<i>Special AIRS Types</i>	55
APPENDIX B. AIRS LEVEL-1B FILENAME AND LOCAL GRANULE ID (LGID) CONVENTION	57
APPENDIX C-1. AIRS PRODUCTS	59
APPENDIX C-2. AIRS DYNAMIC INPUTS	67
APPENDIX C-3. AIRS STATIC ANCILLARY INPUTS	71

LIST OF TABLES

TABLE 1. PRODUCT FILE TYPES	1
-----------------------------------	---

1 Introduction

1.1 Purpose

This document describes the released product files for the Version 2.7.12.0 (V2.7.12.0) delivery of the AIRS Science Processing System (ASPS). These products incorporate data from the AIRS, AMSU-A (AMSU-A1 + AMSU-A2) and HSB instruments.

All sample data is Level 1B: calibrated radiances.

The four basic product file types and two QA subset file types are shown in Table 1.

Table 1. Product File Types

<i>ESDT Shortname</i>	<i>Mnemonic Name</i>
AIRIBRAD	L1B_AIRS_SCIENCE
AIRIBQAP	L1B_AIRS_QA
AIRVBRAD	L1B_VIS_SCIENCE
AIRVBQAP	L1B_VIS_QA
AIRABRAD	L1B_AMSU_SCIENCE
AIRHBRAD	L1B_HSB_SCIENCE

Each L1B science file type contains calibrated radiances from 6 minutes of observations. The corresponding QA subset files exclude radiances and other large fields to deliver QA in a compact format.

Data from the AIRS instrument is divided into separate products: AIRIBRAD has infrared data, while AIRVBRAD has Vis/NIR data.

AIRS IR and Vis/NIR radiances are in radiance units, while MW instrument data AIRABRAD and AIRHBRAD are in brightness temperature units.

1.2 Applicable Documents

AIRS Version 2.5.1 Processing Files Description, JPL D-20001, September 2002

Interface Control Document between the Earth Science Data and Information System (ESDIS) and the AIRS Science Processing Systems (ASPS), Earth Science Data and Information System Project Number 423-42-07, JPL D-22992, February 2002

Operations Agreement (OA) between the Goddard Space Flight Center (GSFC) Distributed Active Archive Center (DAAC) and the AIRS Team Leader Science Computing Facility (TLSCF), JPL D-23045, January 2002

AIRS Production Rules, Version 2.1 Delivery, JPL D-19997, December 2000

AIRS Version 2.1 Operations Guide, JPL D-19999, January 2001

AIRS Science Processing System Software Development Methodology, JPL D-18573, February 19, 2000

AIRS Product Generation System (PGS) Version 2.1 Requirements and Design Document, JPL D-19556, January 2001

AIRS Product Generation System (PGS) Version 1.5 Requirements and Design Document, JPL D-18926, January 2001

AIRS Product Generation System (PGS) Version 1 Requirements and Design Document (Preliminary), JPL D-17851, Version 1.1, July 1999

AIRS Version 2.0 System Description Document, Version 2.0, JPL D-19557, August 2000

AIRS SSI&T Procedures and Agreement with the GSFC DAAC, JPL D-16791, Revision 1.0, March 1, 2000

AIRS Product Generation System (PGS) Prototype 8 Requirements and Design Document (Preliminary), JPL D-16451, Version 1.0, December 1998

AIRS Data Processing and Instrument Operations (DPIO) Software Requirements Document, JPL D-16785, Version 1.0, April 3, 1998

1.3 Acronyms

AIRS	Atmospheric Infrared Sounder
AMSU-A	Advanced Microwave Sounding Unit - Version A (AMSU-A1 and AMSU-A2)
APID	Application Process Identifier
ASPS	AIRS Science Processing System
BRTEMP	Brightness Temperature
DAAC	Distributed Active Archive Center
DECOM	Decommuration
DN	Data Number
DPIO	Data Processing and Instrument Operations
ECS	EOSDIS Core System
EDOS	EOS Data Operations Service
EMOS	EOS Mission Operations System
ENG	Engineering
EOS	Earth Observing System
ESDIS	Earth Science and Data Information System
ESDT	Earth Science Data Type
GSFC	Goddard Space Flight Center
HSB	Humidity Sounder for Brazil

HDF	Hierarchical Data Format
ICD	Interface Control Document
IR	Infrared
L1A	Level 1A
L1B	Level 1B
L2	Level 2
LGID	Local Granule ID
LID	Logical ID
MW	Microwave
NDVI	Normalized Differential Vegetation Index
NIR	Near Infrared
NOAA	National Oceanic and Atmospheric Administration
OA	Operations Agreement
PCF	Process Control File
PGE	Product Generation Executive
PGS	Product Generation System
PSA	Product Specific Attributes
QA	Quality Assessment
SCF	Science Computing Facility
SDPS	Science and Data Processing Segment
SPS	Science Processing System
SSI&T	Science Software Integration and Test
TAI	Universal Atomic Time
TLSCF	Team Leader Science Computing Facility
Vis	Visible
UTC	Coordinated Universal Time

This page intentionally left blank.

Appendix A. Product Interface Specifications

A-1. L1B AIRS Science Interface Specification

Interface Specification Version 2.7.12.0
2003-03-03

ESDT ShortName = "AIRIBRAD"

Swath Name = "L1B_AIRS_Science"

Level = "level1B"

Footprints = 90

scanlines per scanset = 3

Dimensions

These fields define all dimensions that can be used for HDF-EOS swath fields.

The names "GeoTrack" and "GeoXTrack" have a special meaning for this document: "Cross-Track" data fields have a hidden dimension of "GeoXTrack"; "Along-Track" data fields have a hidden dimension of "GeoTrack"; "Full Swath Data Fields" have hidden dimensions of both "GeoTrack" and "GeoXTrack".

Name	Value	Explanation
GeoXTrack	90	Dimension across track for footprint positions. Same as number of footprints per scanline. -- starting at the left and increasing towards the right as you look along the satellite's path
GeoTrack	# of scan lines in swath	Dimension along track for footprint positions. Same as number of scanlines in granule. Parallel to the satellite's path, increasing with time. (Nominally 45 for Level-2, AMSU-A, and AIRS/Vis low-rate engineering; 135 for AIRS/Vis and HSB high-rate quantities)
CalXTrack	6	Dimension "across" track for calibration footprint positions. Same as number of calibration footprints per scanline. (NUM_FOOTPRINTS_AIRS_CALIB) (Footprints are ordered: 1-4: spaceviews (ports 3, 4, 1, 2); 5: blackbody radiometric calibration source; 6: spectral/photometric calibration sources)
SpaceXTrack	4	Dimension "across" track for spaceview calibration footprint positions in order of observation time. (NUM_FOOTPRINTS_AIRS_SPACE)
BBXTrack	1	Dimension "across" track for blackbody calibration footprint positions in order of observation time. (NUM_FOOTPRINTS_AIRS_BB)
Channel	2378	Dimension of radiance array
DCRChannel	1590	Dimension of DC-Restored channels (All AIRS channels except modules 1 & 2 and photo-conductive modules 11 & 12)
MaxRefChannel	100	Maximum number of radiometric reference channels
SpectralXTrack	2	Dimension "across" track of AIRS near-nadir footprints per scanline considered for use in spectral calibration. Direction is the same as GeoXTrack -- starting at the left and increasing towards the right as you look along the satellite's path
Module	17	Number of Photovoltaic & Photoconductive modules in AIRS (17)
PVModule	10	Number of Photovoltaic modules in AIRS (10)
MaxFeaturesUpwell	35	Maximum number of spectral features in upwelling radiances used for spectral calibration
MaxFeaturesPary	17	Maximum number of spectral features in parylene radiances used for spectral calibration

Geolocation Fields

These fields appear for every footprint (GeoTrack * GeoXTrack times) and correspond to footprint center coordinates and "shutter" time.

Name	Explanation
Latitude	Footprint boresight geodetic Latitude in degrees North (-90.0 ... 90.0)
Longitude	Footprint boresight geodetic Longitude in degrees East (-180.0 ... 180.0)
Time	Footprint "shutter" TAI Time: floating-point elapsed seconds since Jan 1, 1993

Size: 291600 bytes (0.3 MB) per 45-scanset granule

Attributes

These fields appear only once per granule

Name	Type	Extra Dimensions	Explanation
processing_level	string of 8-bit characters	None	Zero-terminated character string denoting processing level ("level1B")
instrument	string of 8-bit characters	None	Zero-terminated character string denoting instrument ("AIRS")
DayNightFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule as day and/or night: (Always "Day", "Night", or "Both")
AutomaticQAFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule data quality: (Always "Passed", "Failed", or "Suspect")
NumTotalData	32-bit integer	None	Total number of expected scene footprints
NumProcessData	32-bit integer	None	Number of scene footprints which are present and can be processed routinely (state = 0)
NumSpecialData	32-bit integer	None	Number of scene footprints which are present and can be processed only as a special test (state = 1)
NumBadData	32-bit integer	None	Number of scene footprints which are present but cannot be processed (state = 2)
NumMissingData	32-bit integer	None	Number of expected scene footprints which are not present (state = 3)
NumLandSurface	32-bit integer	None	Number of scene footprints for which the surface is more than 90% land
NumOceanSurface	32-bit integer	None	Number of scene footprints for which the surface is less than 10% land
node_type	string of 8-bit characters	None	Zero-terminated character string denoting whether granule is ascending, descending, or pole-crossing: ("Ascending" and "Descending" for entirely ascending or entirely descending granules, or "NorthPole" or "SouthPole" for pole-crossing granules)
start_year	32-bit integer	None	Year in which granule started, UTC (e.g. 1999)
start_month	32-bit integer	None	Month in which granule started, UTC (1 ... 12)
start_day	32-bit integer	None	Day of month in which granule started, UTC (1 ... 31)
start_hour	32-bit integer	None	Hour of day in which granule started, UTC (0 ... 23)
start_minute	32-bit integer	None	Minute of hour in which granule started, UTC (0 ... 59)
start_sec	32-bit floating-point	None	Second of minute in which granule started, UTC (0.0 ... 59.0)
start_orbit	32-bit integer	None	Orbit number of mission in which granule started
end_orbit	32-bit integer	None	Orbit number of mission in which granule ended
orbit_path	32-bit integer	None	Orbit path of start orbit (1 ... 233 as defined by EOS project)
start_orbit_row	32-bit integer	None	Orbit row at start of granule (1 ... 248 as defined by EOS project)
end_orbit_row	32-bit integer	None	Orbit row at end of granule (1 ... 248 as defined by EOS project)
granule_number	32-bit integer	None	Number of granule within day (1 ... 240)
num_scansets	32-bit integer	None	Number of scansets in granule (1 ... 45)
num_scanlines	32-bit integer	None	Number of scanlines in granule (3 * num_scansets)
start_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at start of granule in degrees North (-90.0 ... 90.0)
start_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at start of granule in degrees East (-180.0 ... 180.0)
start_Time	64-bit floating-point	None	TAI Time at start of granule (floating-point elapsed seconds since start of 1993)
end_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at end of granule in degrees North (-90.0 ... 90.0)
end_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at end of granule in degrees East (-180.0 ... 180.0)
end_Time	64-bit floating-point	None	TAI Time at end of granule (floating-point elapsed seconds since start of 1993)
eq_x_longitude	32-bit floating-point	None	Longitude of spacecraft at southward equator crossing nearest granule start in degrees East (-180.0 ... 180.0)
eq_x_tai	64-bit floating-point	None	Time of eq_x_longitude in TAI units (floating-point elapsed seconds since start of 1993)
orbitgeoqa	32-bit unsigned integer	None	Orbit Geolocation QA: bit 0 (LSB): bad input value (last scanline); bit 1: bad input value (first scanline); bit 2: PGS_EPH_GetEphMet() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 3: PGS_EPH_GetEphMet() returned PGSEPH_E_RAD_ARRAY_SIZE; bit 4: PGS_EPH_GetEphMet()

			returned PGSTD_E_TIME_FMT_ERROR; bit 5: PGS_EPH_GetEphMet() returned PGSTD_E_TIME_VALUE_ERROR; bit 6: PGS_EPH_GetEphMet() returned PGSTD_E_SC_TAG_UNKNOWN; bit 7: PGS_EPH_GetEphMet() returned PGS_E_TOOLKIT; bit 8: PGS_TD_UTCtoTAI() returned PGSTD_E_NO_LEAP_SECS; bit 9: PGS_TD_UTCtoTAI() returned PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_TD_UTCtoTAI() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_TD_UTCtoTAI() returned PGS_E_TOOLKIT; bit 12: PGS_CSC_DayNight() returned PGSTD_E_NO_LEAP_SECS; bit 13: PGS_CSC_DayNight() returned PGSCSC_E_INVALID_LIMITTAG; bit 14: PGS_CSC_DayNight() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_DayNight() returned PGSCSC_W_ERROR_IN_DAYNIGHT; bit 16: PGS_CSC_DayNight() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 17: PGS_CSC_DayNight() returned PGSCSC_W_BELOW_HORIZON; bit 18: PGS_CSC_DayNight() returned PGSCSC_W_PREDICTED_UT1; bit 19: PGS_CSC_DayNight() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_DayNight() returned PGSTD_E_BAD_INITIAL_TIME; bit 21: PGS_CSC_DayNight() returned PGSCBP_E_TIME_OUT_OF_RANGE; bit 22: PGS_CSC_DayNight() returned PGSCBP_E_UNABLE_TO_OPEN_FILE; bit 22: PGS_CSC_DayNight() returned PGSMEM_E_NO_MEMORY; bit 24: PGS_CSC_DayNight() returned PGS_E_TOOLKIT; bit 25-31: not used
num_satgeoqa	16-bit integer	None	Number of scans with problems in satgeoqa
num_glintgeoqa	16-bit integer	None	Number of scans with problems in glintgeoqa
num_moongeoqa	16-bit integer	None	Number of scans with problems in moongeoqa
num_ftptgeoqa	16-bit integer	None	Number of footprints with problems in ftptgeoqa
num_zengeoqa	16-bit integer	None	Number of footprints with problems in zengeoqa
num_demgeoqa	16-bit integer	None	Number of footprints with problems in demgeoqa
num_fpe	16-bit integer	None	Number of floating point errors
LonGranuleCen	16-bit integer	None	Geodetic Longitude of the center of the granule in degrees East (-180 ... 180)
LatGranuleCen	16-bit integer	None	Geodetic Latitude of the center of the granule in degrees North (-90 ... 90)
LocTimeGranuleCen	16-bit integer	None	Local solar time at the center of the granule in minutes past midnight (0 ... 1439)
CalGranSummary	8-bit unsigned integer	None	Bit field. Bitwise OR of CalChanSummary, over all good channels (see ExcludedChans) Zero means all good channels were well calibrated, for all scanlines. bit 7 (MSB): scene over/underflow; bit 6: anomaly in offset calculation; bit 5: anomaly in gain calculation; bit 4: pop detected; bit 3: noise out of bounds; bit 2: anomaly in spectral calibration; bit 1: Telemetry; bit 0: unused (reserved);
CalChanSummary	8-bit unsigned integer	Channel (= 2378)	Bit field. Bitwise OR of CalFlag, by channel, over all scanlines. Noise threshold and spectral quality added. Zero means the channel was well calibrated for all scanlines bit 7 (MSB): scene over/underflow; bit 6: anomaly in offset calculation; bit 5: anomaly in gain calculation; bit 4: pop detected; bit 3: noise out of bounds; bit 2: anomaly in spectral calibration; bit 1: Telemetry; bit 0: unused (reserved);
ExcludedChans	8-bit unsigned integer	Channel (= 2378)	An integer 0-6, indicating A/B detector weights. Used in L1B processing. 0 - A weight = B weight. Probably better than channels with state > 2; 1 - A-side only. Probably better than channels with state > 2; 2 - B-side only. Probably better than channels with state > 2; 3 - A weight = B weight. Probably better than channels with state = 6; 4 - A-side only. Probably better than channels with state = 6; 5 - B-side only. Probably better than channels with state = 6; 6 - A weight = B weight.
NeN	32-bit floating-point	Channel (= 2378)	Noise-equivalent Radiance (radiance units) for an assumed 250K scene
DCR_scan	16-bit integer	None	Scanline number of (first) DC-Restore. 0 for no DC-Restore
input_scene_counts	Limited Engineering Struct (see below)	Channel (= 2378)	Input statistics on scene data numbers
input_space_counts	Limited Engineering Struct (see below)	SpaceXTrack (= 4) * Channel (= 2378)	Input statistics on spaceview data numbers
input_space_signals	Limited Engineering Struct (see below)	SpaceXTrack (= 4) * Channel (= 2378)	Input statistics on spaceview signals (data numbers with offset subtracted)
input_space_diffs	Unlimited Engineering Struct (see below)	SpaceXTrack (= 4) * Channel (= 2378)	Statistics on differences between corresponding space views, for consecutive scanlines
input_bb_counts	Limited Engineering Struct (see below)	Channel (= 2378)	Input statistics on blackbody calibration data numbers

	Struct (see below)		
input_bb_signals	Limited Engineering Struct (see below)	Channel (= 2378)	Input statistics on blackbody calibration signals (data numbers with offset subtracted)
input_spec_counts	Limited Engineering Struct (see below)	Channel (= 2378)	Input statistics on spectral calibration data numbers
input_bb_temp	Limited Engineering Struct (see below)	None	Input statistics on Blackbody temperature
input_bb_temp1	Limited Engineering Struct (see below)	None	Input statistics on Blackbody temperature 1A (CaBbTempV1A or CaBbTempV1B, as active)
input_bb_temp2	Limited Engineering Struct (see below)	None	Input statistics on Blackbody temperature 2 (CaBbTempV2A or CaBbTempV2B, as active)
input_bb_temp3	Limited Engineering Struct (see below)	None	Input statistics on Blackbody temperature 3 (CaBbTemp3, active A or B)
input_bb_temp4	Limited Engineering Struct (see below)	None	Input statistics on Blackbody temperature4 (CaBbTemp4, active A or B)
input_spec_temp	Limited Engineering Struct (see below)	None	Input statistics on Spectrometer temperature
input_ir_det_temp	Limited Engineering Struct (see below)	None	Input statistics on IR detector temperature
input_grating_temp_1	Limited Engineering Struct (see below)	None	Input statistics on Grating temperature 1 (SpGratngTemp1, active A or B)
input_grating_temp_2	Limited Engineering Struct (see below)	None	Input statistics on Grating temperature 2 (SpGratngTemp2, active A or B)
input_entr_filt_temp	Limited Engineering Struct (see below)	None	Input statistics on the entrance filter temperature (SpEntFiltTmp, active A or B)
input_opt_bench_temp_2	Limited Engineering Struct (see below)	None	Input statistics on optical bench temperature 2 (SpOptBnchTmp2, active A or B)
input_opt_bench_temp_3	Limited Engineering Struct (see below)	None	Input statistics on optical bench temperature 3 (SpOptBnchTmp3, active A or B)
input_scan_mirror_temp	Limited Engineering Struct (see below)	None	Input statistics on scan mirror housing temperature
input_chopper_phase_err	Limited Engineering Struct (see below)	None	Input statistics on chopper phase error voltage (ChPhaseErrVA or ChPhaseErrVB, as active)
PopCount	32-bit integer	None	Number of popcorn events within granule, i.e. number of times than an AIRS channel used in the Level 2 retrieval has suffered a sudden discontinuity in dark current
offset_stats	Unlimited Engineering Struct (see below)	Channel (= 2378)	Statistics on offsets
gain_stats	Unlimited Engineering Struct (see below)	Channel (= 2378)	Statistics on gains

	Struct (see below)		
rad_stats	Unlimited Engineering Struct (see below)	Channel (= 2378)	Statistics on radiances (radiance units)
NumRefChannels	32-bit integer	None	The number of channels reported in MaxRefChannel arrays
RefChannels	32-bit integer	MaxRefChannel (= 100)	The 1-based indexes of channels reported in MaxRefChannel arrays
rad_scan_stats	Unlimited Engineering Struct (see below)	GeoXTrack (= 90) * MaxRefChannel (= 100)	Statistics on scan angle dependence of radiances
Rdiff_swindow_M1a_chan	16-bit integer	None	Array M1a channel used as one reference in calculating Rdiff_swindow. (index into radiance & frequency arrays 1...2378)
Rdiff_swindow_M2a_chan	16-bit integer	None	Array M2a channel used as one reference in calculating Rdiff_swindow. (index into radiance & frequency arrays 1...2378)
Rdiff_lwindow_M8_chan	16-bit integer	None	Array M8 channel used as one reference in calculating Rdiff_lwindow. (index into radiance & frequency arrays 1...2378)
Rdiff_lwindow_M9_chan	16-bit integer	None	Array M9 channel used as one reference in calculating Rdiff_lwindow. (index into radiance & frequency arrays 1...2378)
Rdiff_strat_M2b_chan	16-bit integer	None	Array M2b channel used as one reference in calculating Rdiff_strat. (index into radiance & frequency arrays 1...2378)
Rdiff_strat_M1b_chan	16-bit integer	None	Array M1b channel used as one reference in calculating Rdiff_strat. (index into radiance & frequency arrays 1...2378)
granules_present	string of 8-bit characters	None	Zero-terminated character string denoting which adjacent granules were available for smoothing ("All" for both previous & next, "Prev" for previous but not next, "Next" for next but not previous, "None" for neither previous nor next)
spectral_TAI	64-bit floating-point	None	TAI time of (first) Spectral calibration. (floating-point elapsed seconds since start of 1993) 0 for no Spectral calibration occurred in this granule.
nominal_freq	32-bit floating-point	Channel (= 2378)	Nominal frequencies (in cm**-1) of each channel
spectral_freq	32-bit floating-point	Channel (= 2378)	Calculated frequencies (in cm**-1)
spectral_freq_unc	32-bit floating-point	Channel (= 2378)	Uncertainty in calculated frequencies (in cm**-1)
spec_shift_upwell	32-bit floating-point	None	Focal plane shift calculated in grating model fit to upwelling radiances (microns)
spec_shift_unc_upwell	32-bit floating-point	None	Uncertainty of the focal plane shift calculated in the grating model fit to upwelling radiances (microns)
spec_fl_upwell	32-bit floating-point	None	Focal length calculated in grating model fit to upwelling radiances (microns)
spec_fl_unc_upwell	32-bit floating-point	None	Uncertainty of focal length calculated in grating model fit to upwelling radiances (microns)
SpectralFeaturesUpwell	32-bit integer	None	The actual number of upwelling features for MaxFeaturesUpwell-sized arrays
spec_feature_shifts_upwell	32-bit floating-point	MaxFeaturesUpwell (= 35)	Spectral shift seen for each upwelling feature, in microns at the focal plane
spec_feature_corr_upwell	32-bit floating-point	MaxFeaturesUpwell (= 35)	Maximum correlation seen for each upwelling feature (0.0 ... 1.0)
spec_feature_sharp_upwell	32-bit floating-point	MaxFeaturesUpwell (= 35)	Quadratic coefficient in fit to correlation for each upwelling feature
spec_feature_resid_upwell	32-bit floating-point	MaxFeaturesUpwell (= 35)	Fit residual for each upwelling feature (wavenumbers)
spec_iter_upwell	16-bit integer	None	Number of amoeba iterations to fit the grating model to upwelling radiance feature positions
spec_feature_contrast_stats	Limited Engineering Struct (see below)	MaxFeaturesUpwell (= 35)	Statistics on the spectral contrasts for each of the upwelling features, for each of the scene footprints considered for spectral calibration
spec_clim_select	16-bit integer	None	Number of the climatology to which the upwelling features were fitted
spec_shift_pary	32-bit floating-point	None	Focal plane shift calculated in grating model fit to parylene radiances (microns)
spec_shift_unc_pary	32-bit floating-point	None	Uncertainty of the focal plane shift calculated in grating model fit to parylene radiances (microns)

spec_fl_pary	32-bit floating-point	None	Focal length calculated in grating model fit to parylene radiances (microns)
spec_fl_unc_pary	32-bit floating-point	None	Uncertainty of focal length calculated in grating model fit to parylene radiances (microns)
SpectralFeaturesPary	32-bit integer	None	The actual number of parylene features for MaxFeaturesPary-sized arrays
spec_feature_shifts_pary	32-bit floating-point	MaxFeaturesPary (= 17)	Spectral shift seen for each parylene feature, in microns at the focal plane
spec_feature_corr_pary	32-bit floating-point	MaxFeaturesPary (= 17)	Maximum correlation seen for each parylene feature (0.0 ... 1.0)
spec_feature_sharp_pary	32-bit floating-point	MaxFeaturesPary (= 17)	Quadratic coefficient in fit to correlation for each parylene feature
spec_feature_resid_pary	32-bit floating-point	MaxFeaturesPary (= 17)	Fit residual for each parylene feature (wavenumbers)
spec_iter_pary	16-bit integer	None	Number of amoeba iterations in fit the grating model to parylene radiance feature positions
ave_pary_spectrum	32-bit floating-point	Channel (= 2378)	The average parylene spectrum (over good scanlines), in milliWatts/m**2/cm**-1/steradian
DCRCount	32-bit integer	None	Number of times a Direct Current Restore was executed for any module

Size: 3776779 bytes (3.8 MB) per granule

Along-Track Data Fields

These fields appear once per scanline (GeoTrack times)

Name	Type	Extra Dimensions	Explanation
satheight	32-bit floating-point	None	Satellite altitude at nadirTAI in km above reference ellipsoid (e.g. 725.2)
satroll	32-bit floating-point	None	Satellite attitude roll angle at nadirTAI (-180.0 ... 180.0 angle about the +x (roll) ORB axis, +x axis is positively oriented in the direction of orbital flight completing an orthogonal triad with y and z.)
satpitch	32-bit floating-point	None	Satellite attitude pitch angle at nadirTAI (-180.0 ... 180.0 angle about +y (pitch) ORB axis, +y axis is oriented normal to the orbit plane with the positive sense opposite to that of the orbit's angular momentum vector H.)
satyaw	32-bit floating-point	None	Satellite attitude yaw angle at nadirTAI (-180.0 ... 180.0 angle about +z (yaw) axis, +z axis is positively oriented earthward parallel to the satellite radius vector R from the spacecraft center of mass to the center of the Earth.)
satgeoqa	32-bit unsigned integer	None	Satellite Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAItoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAItoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_EPH_EphemAttit() returned PGSEPH_W_BAD_EPHEM_VALUE; bit 4: PGS_EPH_EphemAttit() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 5: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 6: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_DATA_REQUESTED; bit 7: PGS_EPH_EphemAttit() returned PGSTD_E_SC_TAG_UNKNOWN; bit 8: PGS_EPH_EphemAttit() returned PGSEPH_E_BAD_ARRAY_SIZE; bit 9: PGS_EPH_EphemAttit() returned PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_EPH_EphemAttit() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_EPH_EphemAttit() returned PGSTD_E_NO_LEAP_SECS; bit 12: PGS_EPH_EphemAttit() returned PGS_E_TOOLKIT; bit 13: PGS_CSC_ECIttoECR() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 14: PGS_CSC_ECIttoECR() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_ECIttoECR() returned PGSTD_E_NO_LEAP_SECS; bit 16: PGS_CSC_ECIttoECR() returned PGSTD_E_TIME_FMT_ERROR; bit 17: PGS_CSC_ECIttoECR() returned PGSTD_E_TIME_VALUE_ERROR; bit 18: unused (set to zero); bit 19: PGS_CSC_ECIttoECR() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_ECIttoECR() returned PGS_E_TOOLKIT; bit 21: PGS_CSC_ECRtoGEO() returned PGSCSC_W_TOO_MANY_ITERS; bit 22: PGS_CSC_ECRtoGEO() returned PGSCSC_W_INVALID_ALTITUDE; bit 23: PGS_CSC_ECRtoGEO() returned PGSCSC_W_SPHERE_BODY; bit 24: PGS_CSC_ECRtoGEO() returned PGSCSC_W_LARGE_FLATTENING; bit 25: PGS_CSC_ECRtoGEO() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 26: PGS_CSC_ECRtoGEO() returned PGSCSC_E_BAD_EARTH_MODEL; bit 27: PGS_CSC_ECRtoGEO() returned PGS_E_TOOLKIT; bit 28-31: not used
glintgeoqa	16-bit unsigned integer	None	Glint Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: glint location in Earth's shadow; bit 2: glint calculation not converging; bit 3: glint location sun vs. satellite zenith mismatch; bit 4: glint location sun vs. satellite azimuth mismatch; bit 5: bad glint location; bit 6: PGS_CSC_ZenithAzimuth() returned any 'W' class return code; bit 7: PGS_CSC_ZenithAzimuth() returned any 'E' class return code; bit 8: PGS_CBP_Earth_CB_Vector() returned any 'W' class return code; bit 9: PGS_CBP_Earth_CB_Vector() returned any 'E' class return code; bit 10: PGS_CSC_ECIttoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1 (for Glint); bit 11: PGS_CSC_ECIttoECR() returned any 'E' class return code (for Glint); bit 12: PGS_CSC_ECRtoGEO() returned any 'W' class return code (for Glint); bit 13: PGS_CSC_ECRtoGEO() returned any 'E' class return code (for Glint); bit 14: PGS_CSC_ECIttoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_ECIttoECR() returned any 'E' class

			return code
moongeoa	16-bit unsigned integer	None	Moon Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAtoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAtoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_CBP_Sat_CB_Vector() returned PGSCSC_W_BELOW_SURFACE; bit 4: PGS_CBP_Sat_CB_Vector() returned PGSCBP_W_BAD_CB_VECTOR; bit 5: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_BAD_ARRAY_SIZE; bit 6: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_INVALID_CB_ID; bit 7: PGS_CBP_Sat_CB_Vector() returned PGSMEM_E_NO_MEMORY; bit 8: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_UNABLE_TO_OPEN_FILE; bit 9: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_BAD_INITIAL_TIME; bit 10: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_TIME_OUT_OF_RANGE; bit 11: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_SC_TAG_UNKNOWN; bit 12: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 13: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 14: PGS_CBP_Sat_CB_Vector() returned PGS_E_TOOLKIT; bit 15: not used
nadirTAI	64-bit floating-point	None	TAI time at which instrument is nominally looking directly down. (between footprints 15 & 16 for AMSU or between footprints 45 & 46 for AIRS/Vis & HSB) (floating-point elapsed seconds since start of 1993)
sat_lat	64-bit floating-point	None	Satellite geodetic latitude in degrees North (-90.0 ... 90.0)
sat_lon	64-bit floating-point	None	Satellite geodetic longitude in degrees East (-180.0 ... 180.0)
scan_node_type	8-bit integer	None	'A' for ascending, 'D' for descending, 'N' for North-Polar, 'S' for South-Polar
glintlat	32-bit floating-point	None	Solar glint geodetic latitude in degrees North at nadirTAI (-90.0 ... 90.0)
glintlon	32-bit floating-point	None	Solar glint geodetic longitude in degrees East at nadirTAI (-180.0 ... 180.0)
CalScanSummary	8-bit unsigned integer	None	Bit field. Bitwise OR of CalFlag over the good channel list (see ExcludedChans). Zero means all "good" channels were well calibrated for this scanline bit 7 (MSB): scene over/underflow; bit 6: anomaly in offset calculation; bit 5: anomaly in gain calculation; bit 4: pop detected; bit 3: DCR Occurred; bit 2: Moon in View; bit 1: telemetry out of limit condition; bit 0: unused (reserved)
CalFlag	8-bit unsigned integer	Channel (= 2378)	Bit field, by channel, for the current scanline. Zero means the channel was well calibrated, for this scanline. bit 7 (MSB): scene over/underflow; bit 6: anomaly in offset calculation; bit 5: anomaly in gain calculation; bit 4: pop detected; bit 3: DCR Occurred; bit 2: Moon in View; bit 1: telemetry out of limit condition; bit 0: unused (reserved)
SpaceViewDelta	32-bit floating-point	Channel (= 2378)	The mean of the four spaceviews immediately following the Earth views in the scanline, minus the mean of the spaceviews immediately preceding the Earth views in the scanline (also the magnitude of a "pop" in this scanline, when the "pop detected" bit is set in CalFlag.) (data numbers)
spaceview_selection	8-bit unsigned integer	None	Indicates which footprints were included for this scan. Each bit is high when the corresponding space view is used in the spaceview offset calculation. (See L1B Processing Requirements, section 6.2); LSB is first space view.
gain	32-bit floating-point	MaxRefChannel (= 100)	Gain: number of radiance units per count
OpMode	16-bit unsigned integer	None	Instrument Operations Mode. See AIRS Command Handbook, section 6.4 for a definition of each bit. bits 0 (LSB)-2 cal phase; bits 3-6 Cal Func; bit 7 quicklook (expedited) flag; bits 8-11 submode bits 12-14 Mode (0=standby, 1=ready, 2=operate, 3=checkout, 4=decontaminate, 5=off, 6=survival); bit 16 transition flag
DpCircCount	16-bit unsigned integer	None	Data Processing circumvention counts (active A or B) (counts)
DpCircBasThr	16-bit unsigned integer	None	Data Processing circumvention base threshold (active A or B)

Size: 1667925 bytes (1.7 MB) per 45-scanset granule

Full Swath Data Fields

These fields appear for every footprint of every scanline in the granule (GeoTrack * GeoXTrack times)

Name	Type	Extra Dimensions	Explanation
radiances	32-bit floating-point	Channel (= 2378)	Radiances for each channel in milliWatts/m**2/cm**1/steradian (Channels are generally in order of increasing wavenumber, but because frequencies can vary and because all detectors from a physical array of detector elements (a "module") are always grouped together there are sometimes small reversals in frequency order where modules overlap.)
scanang	32-bit floating-point	None	Scanning angle of AIRS instrument with respect to the AIRS Instrument for this footprint (-180.0 ... 180.0, negative at start of scan, 0 at nadir)
ftptgeoqa	32-bit unsigned integer	None	Footprint Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAtoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAtoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_MISS_EARTH; bit 4: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_SC_TAG_UNKNOWN; bit 5:

			PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_ZERO_PIXEL_VECTOR; bit 6: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_EPH_FOR_PIXEL; bit 7: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_INSTRUMENT_OFF_BOARD; bit 8: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_ACCURACY_FLAG; bit 9: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 10: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 11: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DATA_FILE_MISSING; bit 12: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_NEG_OR_ZERO_RAD; bit 13: PGS_CSC_GetFOV_Pixel() returned PGSMEM_E_NO_MEMORY; bit 14: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_LEAP_SECS; bit 15: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_FMT_ERROR; bit 16: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_VALUE_ERROR; bit 17: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_PREDICTED_UT1; bit 18: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_UT1_VALUE; bit 19: PGS_CSC_GetFOV_Pixel() returned PGS_E_TOOLKIT; bit 20: PGS_CSC_GetFOV_Pixel() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 21: PGS_CSC_GetFOV_Pixel() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 22-31: not used
zengeoqa	16-bit unsigned integer	None	Satellite zenith Geolocation QA flags: bit 0 (LSB): (Spacecraft) bad input value; bit 1: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_BELOW_HORIZON; bit 2: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 3: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_NO_REFRACTION; bit 4: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_INVALID_VECTAG; bit 5: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_LOOK_PT_ALTTIT_RANGE; bit 6: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 7: PGS_CSC_ZenithAzimuth(S/C) returned PGS_E_TOOLKIT; bit 8: (Sun) bad input value; bit 9: (suppressed) PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_BELOW_HORIZON (This is not an error condition - the sun is below the horizon at night); bit 10: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 11: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_NO_REFRACTION; bit 12: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_INVALID_VECTAG; bit 13: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_LOOK_PT_ALTTIT_RANGE; bit 14: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 15: PGS_CSC_ZenithAzimuth(Sun) returned PGS_E_TOOLKIT
demgeoqa	16-bit unsigned integer	None	Digital Elevation Model (DEM) Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: Could not allocate memory; bit 2: Too close to North or South pole. Excluded; bit 3: Layer resolution incompatibility. Excluded; bit 4: Any DEM Routine (elev) returned PGSDM_E_IMPROPER_TAG; bit 5: Any DEM Routine (elev) returned PGSDM_E_CANNOT_ACCESS_DATA; bit 6: Any DEM Routine (land/water) returned PGSDM_E_IMPROPER_TAG; bit 7: Any DEM Routine (land/water) returned PGSDM_E_CANNOT_ACCESS_DATA; bit 8: Reserved for future layers; bit 9: Reserved for future layers; bit 10: PGS_DEM_GetRegion(elev) returned PGSDM_M_FILLVALUE_INCLUDED; bit 11: PGS_DEM_GetRegion(land/water) returned PGSDM_M_FILLVALUE_INCLUDED; bit 12: Reserved for future layers; bit 13: PGS_DEM_GetRegion(all) returned PGSDM_M_MULTIPLE_RESOLUTIONS; bit 14: PGS_CSC_GetFOV_Pixel() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_GetFOV_Pixel() returned any 'E' class return code
satzen	32-bit floating-point	None	Spacecraft zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
satazi	32-bit floating-point	None	Spacecraft azimuth angle (-180.0 ... 180.0) degrees E of N GEO)
solzen	32-bit floating-point	None	Solar zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
solazi	32-bit floating-point	None	Solar azimuth angle (-180.0 ... 180.0) degrees E of N GEO)
sun_glint_distance	16-bit integer	None	Distance (km) from footprint center to location of the sun glint (-9999 for unknown, 30000 for no glint visible because spacecraft is in Earth's shadow)
topog	32-bit floating-point	None	Mean topography in meters above reference ellipsoid
topog_err	32-bit floating-point	None	Error estimate for topog
landFrac	32-bit floating-point	None	Fraction of spot that is land (0.0 ... 1.0)
landFrac_err	32-bit floating-point	None	Error estimate for landFrac
state	32-bit integer	None	Data state: 0:Process, 1:Special, 2:Erroneous, 3:Missing
Rdiff_swindow	32-bit floating-point	None	Radiance difference in the 2560 cm ⁻¹ window region used to warn of possible errors caused by scene non-uniformity and misalignment of the beams: radiance(Rdiff_swindow_M1a_chan) - radiance(Rdiff_swindow_M2a_chan). (radiance units)
Rdiff_lwindow	32-bit floating-point	None	Radiance difference in the longwave window(850 cm ⁻¹) used to warn of possible errors caused by scene non-uniformity and misalignment of the beams: radiance(Rdiff_lwindow_M8_chan) - radiance(Rdiff_lwindow_M9_chan). (radiance units)
Rdiff_strat	32-bit floating-point	None	Radiance difference in the 2310 cm ⁻¹ CO2 R-Branch temperature sounding region used to warn of possible errors caused by scene non-uniformity and misalignment of the beams: radiance(Rdiff_strat_M1b_chan) - radiance(Rdiff_strat_M2b_chan). (radiance units)

SceneInhomogeneous	8-bit unsigned integer	None	Threshold test for scene inhomogeneity, using band-overlap detectors (bit fields). bit 7 (MSB): scene is inhomogeneous, as determined by the Rdiff_swindow threshold bit 6: scene is inhomogeneous, as determined by the Rdiff_lwindow threshold bit 5: scene is inhomogeneous, as determined by the Rdiff_strat threshold bits 4-0: unused (reserved)
--------------------	------------------------	------	--

Size: 116336250 bytes (116.3 MB) per 45-scanset granule

**Total File Size (plus storage for dimensions and other HDF-EOS overhead):
122072554 bytes (122.1 MB) per 45-scanset granule = 29297.4 MB per day**

Special AIRS Types

Limited Engineering Struct: This type is used for engineering data fields for which there are known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num_in = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num_in = 0)
mean	32-bit floating-point	Mean of in-range values field takes on in granule (not valid when num_in = 0)
dev	32-bit floating-point	Standard Deviation of in-range values field takes on in granule (not valid when num_in = 0)
num_in	32-bit integer	Count of in-range values field takes on in granule
num_lo	32-bit integer	Count of out-of-range low values field takes on in granule
num_hi	32-bit integer	Count of out-of-range high values field takes on in granule
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
range_min	32-bit floating-point	Minimum in-range value. Any value less than this is counted in num_lo and is not used in the calculation of mean & dev.
range_max	32-bit floating-point	Maximum in-range value. Any value greater than this is counted in num_hi and is not used in the calculation of mean & dev.
missing	8-bit integer	Missing limits flags. Bit 0 (LSB) is 1 when yellow low (range_min) limit is missing; Bit 1 is high when yellow high (range_max) limit is missing; other bits unused, set to 0.
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

Unlimited Engineering Struct: This type is used for engineering data fields for which there are NOT known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num = 0)
mean	32-bit floating-point	Mean of values field takes on in granule (not valid when num = 0)
dev	32-bit floating-point	Standard Deviation of values field takes on in granule (not valid when num = 0)
num	32-bit integer	Count of occurrences of field in granule (not including those counted in num_bad)
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

This page intentionally left blank.

A-2. L1B AIRS QA Interface Specification

Interface Specification Version 2.7.12.0
2003-03-03

ESDT ShortName = "AIRBQAP"

Swath Name = "L1B_AIRS_QA"

Level = "level1B"

Footprints = 90

scanlines per scanset = 3

Dimensions

These fields define all dimensions that can be used for HDF-EOS swath fields.

The names "GeoTrack" and "GeoXTrack" have a special meaning for this document: "Cross-Track" data fields have a hidden dimension of "GeoXTrack"; "Along-Track" data fields have a hidden dimension of "GeoTrack"; "Full Swath Data Fields" have hidden dimensions of both "GeoTrack" and "GeoXTrack".

Name	Value	Explanation
GeoXTrack	90	Dimension across track for footprint positions. Same as number of footprints per scanline. -- starting at the left and increasing towards the right as you look along the satellite's path
GeoTrack	# of scan lines in swath	Dimension along track for footprint positions. Same as number of scanlines in granule. Parallel to the satellite's path, increasing with time. (Nominally 45 for Level-2, AMSU-A, and AIRS/Vis low-rate engineering; 135 for AIRS/Vis and HSB high-rate quantities)
CalXTrack	6	Dimension "across" track for calibration footprint positions. Same as number of calibration footprints per scanline. (NUM_FOOTPRINTS_AIRS_CALIB) (Footprints are ordered: 1-4: spaceviews (ports 3, 4, 1, 2); 5: blackbody radiometric calibration source; 6: spectral/photometric calibration sources)
SpaceXTrack	4	Dimension "across" track for spaceview calibration footprint positions in order of observation time. (NUM_FOOTPRINTS_AIRS_SPACE)
BBXTrack	1	Dimension "across" track for blackbody calibration footprint positions in order of observation time. (NUM_FOOTPRINTS_AIRS_BB)
Channel	2378	Dimension of radiance array
DCRChannel	1590	Dimension of DC-Restored channels (All AIRS channels except modules 1 & 2 and photo-conductive modules 11 & 12)
MaxRefChannel	100	Maximum number of radiometric reference channels
SpectralXTrack	2	Dimension "across" track of AIRS near-nadir footprints per scanline considered for use in spectral calibration. Direction is the same as GeoXTrack -- starting at the left and increasing towards the right as you look along the satellite's path
Module	17	Number of Photovoltaic & Photoconductive modules in AIRS (17)
PVModule	10	Number of Photovoltaic modules in AIRS (10)
MaxFeaturesUpwell	35	Maximum number of spectral features in upwelling radiances used for spectral calibration
MaxFeaturesPary	17	Maximum number of spectral features in parylene radiances used for spectral calibration

Geolocation Fields

These fields appear for every footprint (GeoTrack * GeoXTrack times) and correspond to footprint center coordinates and "shutter" time.

Name	Explanation
Latitude	Footprint boresight geodetic Latitude in degrees North (-90.0 ... 90.0)
Longitude	Footprint boresight geodetic Longitude in degrees East (-180.0 ... 180.0)
Time	Footprint "shutter" TAI Time: floating-point elapsed seconds since Jan 1, 1993

Size: 291600 bytes (0.3 MB) per 45-scanset granule

Attributes

These fields appear only once per granule

Name	Type	Extra Dimensions	Explanation
processing_level	string of 8-bit characters	None	Zero-terminated character string denoting processing level ("level1B")
instrument	string of 8-bit characters	None	Zero-terminated character string denoting instrument ("AIRS")

DayNightFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule as day and/or night: (Always "Day", "Night", or "Both")
AutomaticQAFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule data quality: (Always "Passed", "Failed", or "Suspect")
NumTotalData	32-bit integer	None	Total number of expected scene footprints
NumProcessData	32-bit integer	None	Number of scene footprints which are present and can be processed routinely (state = 0)
NumSpecialData	32-bit integer	None	Number of scene footprints which are present and can be processed only as a special test (state = 1)
NumBadData	32-bit integer	None	Number of scene footprints which are present but cannot be processed (state = 2)
NumMissingData	32-bit integer	None	Number of expected scene footprints which are not present (state = 3)
NumLandSurface	32-bit integer	None	Number of scene footprints for which the surface is more than 90% land
NumOceanSurface	32-bit integer	None	Number of scene footprints for which the surface is less than 10% land
node_type	string of 8-bit characters	None	Zero-terminated character string denoting whether granule is ascending, descending, or pole-crossing: ("Ascending" and "Descending" for entirely ascending or entirely descending granules, or "NorthPole" or "SouthPole" for pole-crossing granules)
start_year	32-bit integer	None	Year in which granule started, UTC (e.g. 1999)
start_month	32-bit integer	None	Month in which granule started, UTC (1 ... 12)
start_day	32-bit integer	None	Day of month in which granule started, UTC (1 ... 31)
start_hour	32-bit integer	None	Hour of day in which granule started, UTC (0 ... 23)
start_minute	32-bit integer	None	Minute of hour in which granule started, UTC (0 ... 59)
start_sec	32-bit floating-point	None	Second of minute in which granule started, UTC (0.0 ... 59.0)
start_orbit	32-bit integer	None	Orbit number of mission in which granule started
end_orbit	32-bit integer	None	Orbit number of mission in which granule ended
orbit_path	32-bit integer	None	Orbit path of start orbit (1 ... 233 as defined by EOS project)
start_orbit_row	32-bit integer	None	Orbit row at start of granule (1 ... 248 as defined by EOS project)
end_orbit_row	32-bit integer	None	Orbit row at end of granule (1 ... 248 as defined by EOS project)
granule_number	32-bit integer	None	Number of granule within day (1 ... 240)
num_scansets	32-bit integer	None	Number of scansets in granule (1 ... 45)
num_scanlines	32-bit integer	None	Number of scanlines in granule (3 * num_scansets)
start_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at start of granule in degrees North (-90.0 ... 90.0)
start_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at start of granule in degrees East (-180.0 ... 180.0)
start_Time	64-bit floating-point	None	TAI Time at start of granule (floating-point elapsed seconds since start of 1993)
end_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at end of granule in degrees North (-90.0 ... 90.0)
end_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at end of granule in degrees East (-180.0 ... 180.0)
end_Time	64-bit floating-point	None	TAI Time at end of granule (floating-point elapsed seconds since start of 1993)
eq_x_longitude	32-bit floating-point	None	Longitude of spacecraft at southward equator crossing nearest granule start in degrees East (-180.0 ... 180.0)
eq_x_tai	64-bit floating-point	None	Time of eq_x_longitude in TAI units (floating-point elapsed seconds since start of 1993)
orbitgeoqa	32-bit unsigned integer	None	Orbit Geolocation QA: bit 0 (LSB): bad input value (last scanline); bit 1: bad input value (first scanline); bit 2: PGS_EPH_GetEphMet() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 3: PGS_EPH_GetEphMet() returned PGSEPH_E_BAD_ARRAY_SIZE; bit 4: PGS_EPH_GetEphMet() returned PGSTD_E_TIME_FMT_ERROR; bit 5: PGS_EPH_GetEphMet() returned PGSTD_E_TIME_VALUE_ERROR; bit 6: PGS_EPH_GetEphMet() returned PGSTD_E_SC_TAG_UNKNOWN; bit 7: PGS_EPH_GetEphMet() returned PGS_E_TOOLKIT; bit 8: PGS_TD_UTCtoTAI() returned PGSTD_E_NO_LEAP_SECS; bit 9: PGS_TD_UTCtoTAI() returned PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_TD_UTCtoTAI() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_TD_UTCtoTAI() returned PGS_E_TOOLKIT; bit 12: PGS_CSC_DayNight() returned PGSTD_E_NO_LEAP_SECS; bit 13: PGS_CSC_DayNight() returned PGSCSC_E_INVALID_LIMITTAG; bit 14: PGS_CSC_DayNight() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_DayNight() returned

			PGSCSC_W_ERROR_IN_DAYNIGHT; bit 16: PGS_CSC_DayNight() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 17: PGS_CSC_DayNight() returned PGSCSC_W_BELOW_HORIZON; bit 18: PGS_CSC_DayNight() returned PGSCSC_W_PREDICTED_UT1; bit 19: PGS_CSC_DayNight() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_DayNight() returned PGSTD_E_BAD_INITIAL_TIME; bit 21: PGS_CSC_DayNight() returned PGSCBP_E_TIME_OUT_OF_RANGE; bit 22: PGS_CSC_DayNight() returned PGSCBP_E_UNABLE_TO_OPEN_FILE; bit 22: PGS_CSC_DayNight() returned PGSMEM_E_NO_MEMORY; bit 24: PGS_CSC_DayNight() returned PGS_E_TOOLKIT; bit 25-31: not used
num_satgeoqa	16-bit integer	None	Number of scans with problems in satgeoqa
num_glintgeoqa	16-bit integer	None	Number of scans with problems in glintgeoqa
num_moongeoqa	16-bit integer	None	Number of scans with problems in moongeoqa
num_ftptgeoqa	16-bit integer	None	Number of footprints with problems in ftptgeoqa
num_zengeoqa	16-bit integer	None	Number of footprints with problems in zengeoqa
num_demgeoqa	16-bit integer	None	Number of footprints with problems in demgeoqa
num_fpe	16-bit integer	None	Number of floating point errors
LonGranuleCen	16-bit integer	None	Geodetic Longitude of the center of the granule in degrees East (-180 ... 180)
LatGranuleCen	16-bit integer	None	Geodetic Latitude of the center of the granule in degrees North (-90 ... 90)
LocTimeGranuleCen	16-bit integer	None	Local solar time at the center of the granule in minutes past midnight (0 ... 1439)
CalGranSummary	8-bit unsigned integer	None	Bit field. Bitwise OR of CalChanSummary, over all good channels (see ExcludedChans) Zero means all good channels were well calibrated, for all scanlines. bit 7 (MSB): scene over/underflow; bit 6: anomaly in offset calculation; bit 5: anomaly in gain calculation; bit 4: pop detected; bit 3: noise out of bounds; bit 2: anomaly in spectral calibration; bit 1: Telemetry; bit 0: unused (reserved);
CalChanSummary	8-bit unsigned integer	Channel (= 2378)	Bit field. Bitwise OR of CalFlag, by channel, over all scanlines. Noise threshold and spectral quality added. Zero means the channel was well calibrated for all scanlines bit 7 (MSB): scene over/underflow; bit 6: anomaly in offset calculation; bit 5: anomaly in gain calculation; bit 4: pop detected; bit 3: noise out of bounds; bit 2: anomaly in spectral calibration; bit 1: Telemetry; bit 0: unused (reserved);
ExcludedChans	8-bit unsigned integer	Channel (= 2378)	An integer 0-6, indicating A/B detector weights. Used in L1B processing. 0 - A weight = B weight. Probably better that channels with state > 2; 1 - A-side only. Probably better that channels with state > 2; 2 - B-side only. Probably better that channels with state > 3; 3 - A weight = B weight. Probably better than channels with state = 6; 4 - A-side only. Probably better than channels with state = 6; 5 - B-side only. Probably better than channels with state = 6; 6 - A weight = B weight.
NeN	32-bit floating-point	Channel (= 2378)	Noise-equivalent Radiance (radiance units) for an assumed 250K scene
DCR_scan	16-bit integer	None	Scanline number of (first) DC-Restore. 0 for no DC-Restore
input_scene_counts	Limited Engineering Struct (see below)	Channel (= 2378)	Input statistics on scene data numbers
input_space_counts	Limited Engineering Struct (see below)	SpaceXTrack (= 4) * Channel (= 2378)	Input statistics on spaceview data numbers
input_space_signals	Limited Engineering Struct (see below)	SpaceXTrack (= 4) * Channel (= 2378)	Input statistics on spaceview signals (data numbers with offset subtracted)
input_space_diffs	Unlimited Engineering Struct (see below)	SpaceXTrack (= 4) * Channel (= 2378)	Statistics on differences between corresponding space views, for consecutive scanlines
input_bb_counts	Limited Engineering Struct (see below)	Channel (= 2378)	Input statistics on blackbody calibration data numbers
input_bb_signals	Limited Engineering Struct (see below)	Channel (= 2378)	Input statistics on blackbody calibration signals (data numbers with offset subtracted)
input_spec_counts	Limited Engineering Struct (see below)	Channel (= 2378)	Input statistics on spectral calibration data numbers

	below)		
input_bb_temp	Limited Engineering Struct (see below)	None	Input statistics on Blackbody temperature
input_bb_temp1	Limited Engineering Struct (see below)	None	Input statistics on Blackbody temperature 1A (CaBbTempV1A or CaBbTempV1B, as active)
input_bb_temp2	Limited Engineering Struct (see below)	None	Input statistics on Blackbody temperature 2 (CaBbTempV2A or CaBbTempV2B, as active)
input_bb_temp3	Limited Engineering Struct (see below)	None	Input statistics on Blackbody temperature 3 (CaBbTemp3, active A or B)
input_bb_temp4	Limited Engineering Struct (see below)	None	Input statistics on Blackbody temperature4 (CaBbTemp4, active A or B)
input_spec_temp	Limited Engineering Struct (see below)	None	Input statistics on Spectrometer temperature
input_ir_det_temp	Limited Engineering Struct (see below)	None	Input statistics on IR detector temperature
input_grating_temp_1	Limited Engineering Struct (see below)	None	Input statistics on Grating temperature 1 (SpGratngTemp1, active A or B)
input_grating_temp_2	Limited Engineering Struct (see below)	None	Input statistics on Grating temperature 2 (SpGratngTemp2, active A or B)
input_entr_filt_temp	Limited Engineering Struct (see below)	None	Input statistics on the entrance filter temperature (SpEntFiltTmp, active A or B)
input_opt_bench_temp_2	Limited Engineering Struct (see below)	None	Input statistics on optical bench temperature 2 (SpOptBnchTmp2, active A or B)
input_opt_bench_temp_3	Limited Engineering Struct (see below)	None	Input statistics on optical bench temperature 3 (SpOptBnchTmp3, active A or B)
input_scan_mirror_temp	Limited Engineering Struct (see below)	None	Input statistics on scan mirror housing temperature
input_chopper_phase_err	Limited Engineering Struct (see below)	None	Input statistics on chopper phase error voltage (ChPhaseErrVA or ChPhaseErrVB, as active)
PopCount	32-bit integer	None	Number of popcorn events within granule, i.e. number of times than an AIRS channel used in the Level 2 retrieval has suffered a sudden discontinuity in dark current
offset_stats	Unlimited Engineering Struct (see below)	Channel (= 2378)	Statistics on offsets
gain_stats	Unlimited Engineering Struct (see below)	Channel (= 2378)	Statistics on gains
rad_stats	Unlimited Engineering Struct (see below)	Channel (= 2378)	Statistics on radiances (radiance units)
NumRefChannels	32-bit integer	None	The number of channels reported in MaxRefChannel arrays
RefChannels	32-bit integer	MaxRefChannel !=	The 1-based indexes of channels reported in MaxRefChannel arrays

		100)	
rad_scan_stats	Unlimited Engineering Struct (see below)	GeoXTrack (= 90) * MaxRefChannel (= 100)	Statistics on scan angle dependence of radiances
Rdiff_swindow_M1a_chan	16-bit integer	None	Array M1a channel used as one reference in calculating Rdiff_swindow. (index into radiance & frequency arrays 1...2378)
Rdiff_swindow_M2a_chan	16-bit integer	None	Array M2a channel used as one reference in calculating Rdiff_swindow. (index into radiance & frequency arrays 1...2378)
Rdiff_lwindow_M8_chan	16-bit integer	None	Array M8 channel used as one reference in calculating Rdiff_lwindow. (index into radiance & frequency arrays 1...2378)
Rdiff_lwindow_M9_chan	16-bit integer	None	Array M9 channel used as one reference in calculating Rdiff_lwindow. (index into radiance & frequency arrays 1...2378)
Rdiff_strat_M2b_chan	16-bit integer	None	Array M2b channel used as one reference in calculating Rdiff_strat. (index into radiance & frequency arrays 1...2378)
Rdiff_strat_M1b_chan	16-bit integer	None	Array M1b channel used as one reference in calculating Rdiff_strat. (index into radiance & frequency arrays 1...2378)
granules_present	string of 8-bit characters	None	Zero-terminated character string denoting which adjacent granules were available for smoothing ("All" for both previous & next, "Prev" for previous but not next, "Next" for next but not previous, "None" for neither previous nor next)
spectral_TAI	64-bit floating-point	None	TAI time of (first) Spectral calibration. (floating-point elapsed seconds since start of 1993) 0 for no Spectral calibration occurred in this granule.
nominal_freq	32-bit floating-point	Channel (= 2378)	Nominal frequencies (in cm** ⁻¹) of each channel
spectral_freq	32-bit floating-point	Channel (= 2378)	Calculated frequencies (in cm** ⁻¹)
spectral_freq_unc	32-bit floating-point	Channel (= 2378)	Uncertainty in calculated frequencies (in cm** ⁻¹)
spec_shift_upwell	32-bit floating-point	None	Focal plane shift calculated in grating model fit to upwelling radiances (microns)
spec_shift_unc_upwell	32-bit floating-point	None	Uncertainty of the focal plane shift calculated in the grating model fit to upwelling radiances (microns)
spec_fl_upwell	32-bit floating-point	None	Focal length calculated in grating model fit to upwelling radiances (microns)
spec_fl_unc_upwell	32-bit floating-point	None	Uncertainty of focal length calculated in grating model fit to upwelling radiances (microns)
SpectralFeaturesUpwell	32-bit integer	None	The actual number of upwelling features for MaxFeaturesUpwell-sized arrays
spec_feature_shifts_upwell	32-bit floating-point	MaxFeaturesUpwell (= 35)	Spectral shift seen for each upwelling feature, in microns at the focal plane
spec_feature_corr_upwell	32-bit floating-point	MaxFeaturesUpwell (= 35)	Maximum correlation seen for each upwelling feature (0.0 ... 1.0)
spec_feature_sharp_upwell	32-bit floating-point	MaxFeaturesUpwell (= 35)	Quadratic coefficient in fit to correlation for each upwelling feature
spec_feature_resid_upwell	32-bit floating-point	MaxFeaturesUpwell (= 35)	Fit residual for each upwelling feature (wavenumbers)
spec_iter_upwell	16-bit integer	None	Number of amoeba iterations to fit the grating model to upwelling radiance feature positions
spec_feature_contrast_stats	Limited Engineering Struct (see below)	MaxFeaturesUpwell (= 35)	Statistics on the spectral contrasts for each of the upwelling features, for each of the scene footprints considered for spectral calibration
spec_clim_select	16-bit integer	None	Number of the climatology to which the upwelling features were fitted
spec_shift_pary	32-bit floating-point	None	Focal plane shift calculated in grating model fit to parylene radiances (microns)
spec_shift_unc_pary	32-bit floating-point	None	Uncertainty of the focal plane shift calculated in grating model fit to parylene radiances (microns)
spec_fl_pary	32-bit floating-point	None	Focal length calculated in grating model fit to parylene radiances (microns)
spec_fl_unc_pary	32-bit floating-point	None	Uncertainty of focal length calculated in grating model fit to parylene radiances (microns)
SpectralFeaturesPary	32-bit integer	None	The actual number of parylene features for MaxFeaturesPary-sized arrays
spec_feature_shifts_pary	32-bit floating-point	MaxFeaturesPary (= 17)	Spectral shift seen for each parylene feature, in microns at the focal plane

spec_feature_corr_pary	32-bit floating-point	MaxFeaturesPary (= 17)	Maximum correlation seen for each parylene feature (0.0 ... 1.0)
spec_feature_sharp_pary	32-bit floating-point	MaxFeaturesPary (= 17)	Quadratic coefficient in fit to correlation for each parylene feature
spec_feature_resid_pary	32-bit floating-point	MaxFeaturesPary (= 17)	Fit residual for each parylene feature (wavenumbers)
spec_iter_pary	16-bit integer	None	Number of amoeba iterations in fit the grating model to parylene radiance feature positions
ave_pary_spectrum	32-bit floating-point	Channel (= 2378)	The average parylene spectrum (over good scanlines), in milliWatts/m**2/cm**-1/steradian
DCRCount	32-bit integer	None	Number of times a Direct Current Restore was executed for any module

Size: 3776779 bytes (3.8 MB) per granule

Along-Track Data Fields

These fields appear once per scanline (GeoTrack times)

Name	Type	Extra Dimensions	Explanation
satheight	32-bit floating-point	None	Satellite altitude at nadirTAI in km above reference ellipsoid (e.g. 725.2)
satroll	32-bit floating-point	None	Satellite attitude roll angle at nadirTAI (-180.0 ... 180.0 angle about the +x (roll) ORB axis, +x axis is positively oriented in the direction of orbital flight completing an orthogonal triad with y and z.)
satpitch	32-bit floating-point	None	Satellite attitude pitch angle at nadirTAI (-180.0 ... 180.0 angle about +y (pitch) ORB axis. +y axis is oriented normal to the orbit plane with the positive sense opposite to that of the orbit's angular momentum vector H.)
satyaw	32-bit floating-point	None	Satellite attitude yaw angle at nadirTAI (-180.0 ... 180.0 angle about +z (yaw) axis. +z axis is positively oriented earthward parallel to the satellite radius vector R from the spacecraft center of mass to the center of the Earth.)
satgeoqa	32-bit unsigned integer	None	Satellite Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAtoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAtoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_EPH_EphemAttit() returned PGSEPH_W_BAD_EPHEM_VALUE; bit 4: PGS_EPH_EphemAttit() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 5: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 6: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_DATA_REQUESTED; bit 7: PGS_EPH_EphemAttit() returned PGSTD_E_SC_TAG_UNKNOWN; bit 8: PGS_EPH_EphemAttit() returned PGSEPH_E_BAD_ARRAY_SIZE; bit 9: PGS_EPH_EphemAttit() returned PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_EPH_EphemAttit() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_EPH_EphemAttit() returned PGSTD_E_NO_LEAP_SECS; bit 12: PGS_EPH_EphemAttit() returned PGS_E_TOOLKIT; bit 13: PGS_CSC_ECtoECR() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 14: PGS_CSC_ECtoECR() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_ECtoECR() returned PGSTD_E_NO_LEAP_SECS; bit 16: PGS_CSC_ECtoECR() returned PGSTD_E_TIME_FMT_ERROR; bit 17: PGS_CSC_ECtoECR() returned PGSTD_E_TIME_VALUE_ERROR; bit 18: unused (set to zero); bit 19: PGS_CSC_ECtoECR() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_ECtoECR() returned PGS_E_TOOLKIT; bit 21: PGS_CSC_ECRtoGEO() returned PGSCSC_W_TOO_MANY_ITERS; bit 22: PGS_CSC_ECRtoGEO() returned PGSCSC_W_INVALID_ALTITUDE; bit 23: PGS_CSC_ECRtoGEO() returned PGSCSC_W_SPHERE_BODY; bit 24: PGS_CSC_ECRtoGEO() returned PGSCSC_W_LARGE_FLATTENING; bit 25: PGS_CSC_ECRtoGEO() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 26: PGS_CSC_ECRtoGEO() returned PGSCSC_E_BAD_EARTH_MODEL; bit 27: PGS_CSC_ECRtoGEO() returned PGS_E_TOOLKIT; bit 28-31: not used
glintgeoqa	16-bit unsigned integer	None	Glint Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: glint location in Earth's shadow; bit 2: glint calculation not converging; bit 3: glint location sun vs. satellite zenith mismatch; bit 4: glint location sun vs. satellite azimuth mismatch; bit 5: bad glint location; bit 6: PGS_CSC_ZenithAzimuth() returned any 'W' class return code; bit 7: PGS_CSC_ZenithAzimuth() returned any 'E' class return code; bit 8: PGS_CBP_Earth_CB_Vector() returned any 'W' class return code; bit 9: PGS_CBP_Earth_CB_Vector() returned any 'E' class return code; bit 10: PGS_CSC_ECtoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1 (for Glint); bit 11: PGS_CSC_ECtoECR() returned any 'E' class return code (for Glint); bit 12: PGS_CSC_ECRtoGEO() returned any 'W' class return code (for Glint); bit 13: PGS_CSC_ECRtoGEO() returned any 'E' class return code (for Glint); bit 14: PGS_CSC_ECtoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_ECtoECR() returned any 'E' class return code
moongeoqa	16-bit unsigned integer	None	Moon Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAtoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAtoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_CBP_Sat_CB_Vector() returned PGSCSC_W_BELOW_SURFACE; bit 4: PGS_CBP_Sat_CB_Vector() returned PGSCBP_W_BAD_CB_VECTOR; bit 5: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_BAD_ARRAY_SIZE; bit 6: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_INVALID_CB_ID; bit 7: PGS_CBP_Sat_CB_Vector() returned PGSMFM_E_NO_MEMORY; bit 8: PGS_CBP_Sat_CB_Vector() returned

			PGSCBP_E_UNABLE_TO_OPEN_FILE; bit 9: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_BAD_INITIAL_TIME; bit 10: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_TIME_OUT_OF_RANGE; bit 11: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_SC_TAG_UNKNOWN; bit 12: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 13: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 14: PGS_CBP_Sat_CB_Vector() returned PGS_E_TOOLKIT; bit 15: not used
nadirTAI	64-bit floating-point	None	TAI time at which instrument is nominally looking directly down. (between footprints 15 & 16 for AMSU or between footprints 45 & 46 for AIRS/Vis & HSB) (floating-point elapsed seconds since start of 1993)
sat_lat	64-bit floating-point	None	Satellite geodetic latitude in degrees North (-90.0 ... 90.0)
sat_lon	64-bit floating-point	None	Satellite geodetic longitude in degrees East (-180.0 ... 180.0)
scan_node_type	8-bit integer	None	'A' for ascending, 'D' for descending, 'N' for North-Polar, 'S' for South-Polar
glintlat	32-bit floating-point	None	Solar glint geodetic latitude in degrees North at nadirTAI (-90.0 ... 90.0)
glintlon	32-bit floating-point	None	Solar glint geodetic longitude in degrees East at nadirTAI (-180.0 ... 180.0)
CalScanSummary	8-bit unsigned integer	None	Bit field. Bitwise OR of CalFlag over the good channel list (see ExcludedChans). Zero means all "good" channels were well calibrated for this scanline bit 7 (MSB): scene over/underflow; bit 6: anomaly in offset calculation; bit 5: anomaly in gain calculation; bit 4: pop detected; bit 3: DCR Occurred; bit 2: Moon in View; bit 1: telemetry out of limit condition; bit 0: unused (reserved)
CalFlag	8-bit unsigned integer	Channel (= 2378)	Bit field, by channel, for the current scanline. Zero means the channel was well calibrated, for this scanline. bit 7 (MSB): scene over/underflow; bit 6: anomaly in offset calculation; bit 5: anomaly in gain calculation; bit 4: pop detected; bit 3: DCR Occurred; bit 2: Moon in View; bit 1: telemetry out of limit condition; bit 0: unused (reserved)
SpaceViewDelta	32-bit floating-point	Channel (= 2378)	The mean of the four spaceviews immediately following the Earth views in the scanline, minus the mean of the spaceviews immediately preceding the Earth views in the scanline (also the magnitude of a "pop" in this scanline, when the "pop detected" bit is set in CalFlag.) (data numbers)
spaceview_selection	8-bit unsigned integer	None	Indicates which footprints were included for this scan. Each bit is high when the corresponding space view is used in the spaceview offset calculation. (See L1B Processing Requirements, section 6.2); LSB is first space view.
gain	32-bit floating-point	MaxRefChannel (= 100)	Gain: number of radiance units per count
OpMode	16-bit unsigned integer	None	Instrument Operations Mode. See AIRS Command Handbook, section 6.4 for a definition of each bit. bits 0 (LSB)-2 cal phase; bits 3-6 Cal Func; bit 7 quicklook (expedited) flag; bits 8-11 submode bits 12-14 Mode (0=standby, 1=ready, 2=operate, 3=checkout, 4=decontaminate, 5=off, 6=survival); bit 16 transition flag
DpCircCount	16-bit unsigned integer	None	Data Processing circumvention counts (active A or B) (counts)
DpCircBasThr	16-bit unsigned integer	None	Data Processing circumvention base threshold (active A or B)

Size: 1667925 bytes (1.7 MB) per 45-scanset granule

Full Swath Data Fields

These fields appear for every footprint of every scanline in the granule (GeoTrack * GeoXTrack times)

Name	Type	Extra Dimensions	Explanation
scanang	32-bit floating-point	None	Scanning angle of AIRS instrument with respect to the AIRS Instrument for this footprint (-180.0 ... 180.0, negative at start of scan, 0 at nadir)
ftptgeoqa	32-bit unsigned integer	None	Footprint Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAtoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAtoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_MISS_EARTH; bit 4: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_SC_TAG_UNKNOWN; bit 5: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_ZERO_PIXEL_VECTOR; bit 6: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_EPHEM_FOR_PIXEL; bit 7: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_INSTRUMENT_OFF_BOARD; bit 8: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_ACCURACY_FLAG; bit 9: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 10: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 11: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DATA_FILE_MISSING; bit 12: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_NEG_OR_ZERO_RAD; bit 13: PGS_CSC_GetFOV_Pixel() returned PGSMEM_E_NO_MEMORY; bit 14: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_LEAP_SECS; bit 15: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_FMT_ERROR; bit 16: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_VALUE_ERROR; bit 17: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_PREDICTED_UT1; bit 18: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_UT1_VALUE; bit 19: PGS_CSC_GetFOV_Pixel() returned PGS_E_TOOLKIT; bit 20: PGS_CSC_GetFOV_Pixel()

			returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 21: PGS_CSC_GetFOV_Pixel() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 22-31: not used
zengeoqa	16-bit unsigned integer	None	Satellite zenith Geolocation QA flags: bit 0 (LSB): (Spacecraft) bad input value; bit 1: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_BELOW_HORIZON; bit 2: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 3: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_NO_REFRACTION; bit 4: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_INVALID_VECTAG; bit 5: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_LOOK_PT_ALTIT_RANGE; bit 6: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 7: PGS_CSC_ZenithAzimuth(S/C) returned PGS_E_TOOLKIT; bit 8: (Sun) bad input value; bit 9: (suppressed) PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_BELOW_HORIZON (This is not an error condition - the sun is below the horizon at night); bit 10: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 11: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_NO_REFRACTION; bit 12: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_INVALID_VECTAG; bit 13: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_LOOK_PT_ALTIT_RANGE; bit 14: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 15: PGS_CSC_ZenithAzimuth(Sun) returned PGS_E_TOOLKIT
demgeoqa	16-bit unsigned integer	None	Digital Elevation Model (DEM) Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: Could not allocate memory; bit 2: Too close to North or South pole. Excluded; bit 3: Layer resolution incompatibility. Excluded; bit 4: Any DEM Routine (elev) returned PGSDM_E_IMPROPER_TAG; bit 5: Any DEM Routine (elev) returned PGSDM_E_CANNOT_ACCESS_DATA; bit 6: Any DEM Routine (land/water) returned PGSDM_E_IMPROPER_TAG; bit 7: Any DEM Routine (land/water) returned PGSDM_E_CANNOT_ACCESS_DATA; bit 8: Reserved for future layers; bit 9: Reserved for future layers; bit 10: PGS_DEM_GetRegion(elev) returned PGSDM_M_FILLVALUE_INCLUDED; bit 11: PGS_DEM_GetRegion(land/water) returned PGSDM_M_FILLVALUE_INCLUDED; bit 12: Reserved for future layers; bit 13: PGS_DEM_GetRegion(all) returned PGSDM_M_MULTIPLE_RESOLUTIONS; bit 14: PGS_CSC_GetFOV_Pixel() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_GetFOV_Pixel() returned any 'E' class return code
satzen	32-bit floating-point	None	Spacecraft zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
satazi	32-bit floating-point	None	Spacecraft azimuth angle (-180.0 ... 180.0) degrees E of N GEO)
solzen	32-bit floating-point	None	Solar zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
solazi	32-bit floating-point	None	Solar azimuth angle (-180.0 ... 180.0) degrees E of N GEO)
sun_glint_distance	16-bit integer	None	Distance (km) from footprint center to location of the sun glint (-9999 for unknown, 30000 for no glint visible because spacecraft is in Earth's shadow)
topog	32-bit floating-point	None	Mean topography in meters above reference ellipsoid
topog_err	32-bit floating-point	None	Error estimate for topog
landFrac	32-bit floating-point	None	Fraction of spot that is land (0.0 ... 1.0)
landFrac_err	32-bit floating-point	None	Error estimate for landFrac
state	32-bit integer	None	Data state: 0:Process, 1:Special, 2:Erroneous, 3:Missing
Rdiff_swindow	32-bit floating-point	None	Radiance difference in the 2560 cm ⁻¹ window region used to warn of possible errors caused by scene non-uniformity and misalignment of the beams: radiance(Rdiff_swindow_M1a_chan) - radiance(Rdiff_swindow_M2a_chan). (radiance units)
Rdiff_lwindow	32-bit floating-point	None	Radiance difference in the longwave window(850 cm ⁻¹) used to warn of possible errors caused by scene non-uniformity and misalignment of the beams: radiance(Rdiff_lwindow_M8_chan) - radiance(Rdiff_lwindow_M9_chan). (radiance units)
Rdiff_strat	32-bit floating-point	None	Radiance difference in the 2310 cm ⁻¹ CO2 R-Branch temperature sounding region used to warn of possible errors caused by scene non-uniformity and misalignment of the beams: radiance(Rdiff_strat_M1b_chan) - radiance(Rdiff_strat_M2b_chan). (radiance units)
SceneInhomogeneous	8-bit unsigned integer	None	Threshold test for scene inhomogeneity, using band-overlap detectors (bit fields). bit 7 (MSB): scene is inhomogeneous, as determined by the Rdiff_swindow threshold bit 6: scene is inhomogeneous, as determined by the Rdiff_lwindow threshold bit 5: scene is inhomogeneous, as determined by the Rdiff_strat threshold bits 4-0: unused (reserved)

Size: 765450 bytes (0.8 MB) per 45-scanset granule

**Total File Size (plus storage for dimensions and other HDF-EOS overhead):
6501754 bytes (6.5 MB) per 45-scanset granule = 1560.4 MB per day**

Special AIRS Types

Limited Engineering Struct: This type is used for engineering data fields for which there are known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num_in = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num_in = 0)
mean	32-bit floating-point	Mean of in-range values field takes on in granule (not valid when num_in = 0)
dev	32-bit floating-point	Standard Deviation of in-range values field takes on in granule (not valid when num_in = 0)
num_in	32-bit integer	Count of in-range values field takes on in granule
num_lo	32-bit integer	Count of out-of-range low values field takes on in granule
num_hi	32-bit integer	Count of out-of-range high values field takes on in granule
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
range_min	32-bit floating-point	Minimum in-range value. Any value less than this is counted in num_lo and is not used in the calculation of mean & dev.
range_max	32-bit floating-point	Maximum in-range value. Any value greater than this is counted in num_hi and is not used in the calculation of mean & dev.
missing	8-bit integer	Missing limits flags. Bit 0 (LSB) is 1 when yellow low (range_min) limit is missing; Bit 1 is high when yellow high (range_max) limit is missing; other bits unused, set to 0.
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

Unlimited Engineering Struct: This type is used for engineering data fields for which there are NOT known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num = 0)
mean	32-bit floating-point	Mean of values field takes on in granule (not valid when num = 0)
dev	32-bit floating-point	Standard Deviation of values field takes on in granule (not valid when num = 0)
num	32-bit integer	Count of occurrences of field in granule (not including those counted in num_bad)
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

This page intentionally left blank.

A-3. L1B Visible/NIR Science Interface Specification

Interface Specification Version 2.7.12.0
2003-03-03

ESDT ShortName = "AIRVBRAD"

Swath Name = "L1B_VIS_Science"

Level = "level1B"

Footprints = 90

scanlines per scanset = 3

Dimensions

These fields define all dimensions that can be used for HDF-EOS swath fields.

The names "GeoTrack" and "GeoXTrack" have a special meaning for this document: "Cross-Track" data fields have a hidden dimension of "GeoXTrack"; "Along-Track" data fields have a hidden dimension of "GeoTrack"; "Full Swath Data Fields" have hidden dimensions of both "GeoTrack" and "GeoXTrack".

Name	Value	Explanation
GeoXTrack	90	Dimension across track for footprint positions. Same as number of footprints per scanline. -- starting at the left and increasing towards the right as you look along the satellite's path
GeoTrack	# of scan lines in swath	Dimension along track for footprint positions. Same as number of scanlines in granule. Parallel to the satellite's path, increasing with time. (Nominally 45 for Level-2, AMSU-A, and AIRS/Vis low-rate engineering; 135 for AIRS/Vis and HSB high-rate quantities)
SubTrack	9	VIS detector elements per AIRS footprint along track (9). Direction is the same as GeoTrack -- parallel to the satellite's path, increasing with time. (opposite order to detector ordering -- detector 0 is last)
SubXTrack	8	VIS samples per AIRS footprint across track (8). Direction is the same as GeoXTrack -- starting at the left and increasing towards the right as you look along the satellite's path
Bulb	3	Number of photometric calibration sources (light bulbs) that can be used as sources for photometric calibration (3)
GainHistory	5	Number of photometric gain calculations to store for use in smoothing of gain (5)
GeoLocationsPerSpot	4	Geolocations for the 4 corner pixels in the order: trailing first scanned; trailing last-scanned; leading first-scanned; leading last-scanned. Each footprint also has a central geolocation associated with the swath geolocation lat/lon/time of the footprint.
Channel	4	Dimension of radiance array

Geolocation Fields

These fields appear for every footprint (GeoTrack * GeoXTrack times) and correspond to footprint center coordinates and "shutter" time.

Name	Explanation
Latitude	Footprint boresight geodetic Latitude in degrees North (-90.0 ... 90.0)
Longitude	Footprint boresight geodetic Longitude in degrees East (-180.0 ... 180.0)
Time	Footprint "shutter" TAI Time: floating-point elapsed seconds since Jan 1, 1993

Size: 291600 bytes (0.3 MB) per 45-scanset granule

Attributes

These fields appear only once per granule

Name	Type	Extra Dimensions	Explanation
VISDarkAMSUFOVCount	32-bit integer	None	Number of AMSU-A footprints that are uniformly dark in the level-1B VIS/NIR and are thus likely to be uniformly clear
VISBrightAMSUFOVCount	32-bit integer	None	Number of AMSU-A footprints that are uniformly bright in the level-1B VIS/NIR and are thus likely to be uniformly cloudy
processing_level	string of 8-bit characters	None	Zero-terminated character string denoting processing level ("level1B")
instrument	string of 8-bit characters	None	Zero-terminated character string denoting instrument ("VIS")
DayNightFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule as day and/or night: (Always "Day", "Night", or "Both")
AutomaticQAFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule data quality: (Always "Passed", "Failed", or "Suspect")

NumTotalData	32-bit integer	None	Total number of expected scene footprints
NumProcessData	32-bit integer	None	Number of scene footprints which are present and can be processed routinely (state = 0)
NumSpecialData	32-bit integer	None	Number of scene footprints which are present and can be processed only as a special test (state = 1)
NumBadData	32-bit integer	None	Number of scene footprints which are present but cannot be processed (state = 2)
NumMissingData	32-bit integer	None	Number of expected scene footprints which are not present (state = 3)
NumLandSurface	32-bit integer	None	Number of scene footprints for which the surface is more than 90% land
NumOceanSurface	32-bit integer	None	Number of scene footprints for which the surface is less than 10% land
node_type	string of 8-bit characters	None	Zero-terminated character string denoting whether granule is ascending, descending, or pole-crossing: ("Ascending" and "Descending" for entirely ascending or entirely descending granules, or "NorthPole" or "SouthPole" for pole-crossing granules)
start_year	32-bit integer	None	Year in which granule started, UTC (e.g. 1999)
start_month	32-bit integer	None	Month in which granule started, UTC (1 ... 12)
start_day	32-bit integer	None	Day of month in which granule started, UTC (1 ... 31)
start_hour	32-bit integer	None	Hour of day in which granule started, UTC (0 ... 23)
start_minute	32-bit integer	None	Minute of hour in which granule started, UTC (0 ... 59)
start_sec	32-bit floating-point	None	Second of minute in which granule started, UTC (0.0 ... 59.0)
start_orbit	32-bit integer	None	Orbit number of mission in which granule started
end_orbit	32-bit integer	None	Orbit number of mission in which granule ended
orbit_path	32-bit integer	None	Orbit path of start orbit (1 ... 233 as defined by EOS project)
start_orbit_row	32-bit integer	None	Orbit row at start of granule (1 ... 248 as defined by EOS project)
end_orbit_row	32-bit integer	None	Orbit row at end of granule (1 ... 248 as defined by EOS project)
granule_number	32-bit integer	None	Number of granule within day (1 ... 240)
num_scansets	32-bit integer	None	Number of scansets in granule (1 ... 45)
num_scanlines	32-bit integer	None	Number of scanlines in granule (3 * num_scansets)
start_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at start of granule in degrees North (-90.0 ... 90.0)
start_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at start of granule in degrees East (-180.0 ... 180.0)
start_Time	64-bit floating-point	None	TAI Time at start of granule (floating-point elapsed seconds since start of 1993)
end_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at end of granule in degrees North (-90.0 ... 90.0)
end_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at end of granule in degrees East (-180.0 ... 180.0)
end_Time	64-bit floating-point	None	TAI Time at end of granule (floating-point elapsed seconds since start of 1993)
eq_x_longitude	32-bit floating-point	None	Longitude of spacecraft at southward equator crossing nearest granule start in degrees East (-180.0 ... 180.0)
eq_x_tai	64-bit floating-point	None	Time of eq_x_longitude in TAI units (floating-point elapsed seconds since start of 1993)
orbitgeoqa	32-bit unsigned integer	None	Orbit Geolocation QA: bit 0 (LSB): bad input value (last scanline); bit 1: bad input value (first scanline); bit 2: PGS_EPH_GetEphMet() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 3: PGS_EPH_GetEphMet() returned PGSEPH_E_BAD_ARRAY_SIZE; bit 4: PGS_EPH_GetEphMet() returned PGSTD_E_TIME_FMT_ERROR; bit 5: PGS_EPH_GetEphMet() returned PGSTD_E_TIME_VALUE_ERROR; bit 6: PGS_EPH_GetEphMet() returned PGSTD_E_SC_TAG_UNKNOWN; bit 7: PGS_EPH_GetEphMet() returned PGS_E_TOOLKIT; bit 8: PGS_TD_UTCtoTAI() returned PGSTD_E_NO_LEAP_SECS; bit 9: PGS_TD_UTCtoTAI() returned PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_TD_UTCtoTAI() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_TD_UTCtoTAI() returned PGS_E_TOOLKIT; bit 12: PGS_CSC_DayNight() returned PGSTD_E_NO_LEAP_SECS; bit 13: PGS_CSC_DayNight() returned PGSCSC_E_INVALID_LIMITTAG; bit 14: PGS_CSC_DayNight() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_DayNight() returned PGSCSC_W_ERROR_IN_DAYNIGHT; bit 16: PGS_CSC_DayNight() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 17: PGS_CSC_DayNight() returned PGSCSC_W_BELOW_HORIZON; bit 18: PGS_CSC_DayNight() returned PGSCSC_W_PREDICTED_UT1; bit 19: PGS_CSC_DayNight() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_DayNight() returned PGSTD_E_BAD_INITIAL_TIME; bit 21: PGS_CSC_DayNight() returned

			PGSCBP_E_TIME_OUT_OF_RANGE; bit 22: PGS_CSC_DayNight() returned PGSCBP_E_UNABLE_TO_OPEN_FILE; bit 22: PGS_CSC_DayNight() returned PGSMEM_E_NO_MEMORY; bit 24: PGS_CSC_DayNight() returned PGS_E_TOOLKIT; bit 25-31: not used
num_satgeoqa	16-bit integer	None	Number of scans with problems in satgeoqa
num_glintgeoqa	16-bit integer	None	Number of scans with problems in glintgeoqa
num_moongoqa	16-bit integer	None	Number of scans with problems in moongoqa
num_ftptgeoqa	16-bit integer	None	Number of footprints with problems in ftptgeoqa
num_zengeoqa	16-bit integer	None	Number of footprints with problems in zengeoqa
num_demgeoqa	16-bit integer	None	Number of footprints with problems in demgeoqa
num_fpe	16-bit integer	None	Number of floating point errors
LonGranuleCen	16-bit integer	None	Geodetic Longitude of the center of the granule in degrees East (-180 ... 180)
LatGranuleCen	16-bit integer	None	Geodetic Latitude of the center of the granule in degrees North (-90 ... 90)
LocTimeGranuleCen	16-bit integer	None	Local solar time at the center of the granule in minutes past midnight (0 ... 1439)
VegMapFileName	string of 8-bit characters	None	Name of AVHRR input file used as Vegetation Map
limit_scene_counts	Color Counts (see below)	Channel (= 4) * SubTrack (= 9)	Input limit checking on scene data numbers
limit_bb_counts	Color Counts (see below)	Channel (= 4) * SubTrack (= 9)	Input limit checking on data numbers from the blackbody (dark target)
limit_phot_counts	Color Counts (see below)	Channel (= 4) * SubTrack (= 9)	Input limit checking on data numbers from the photometric calibration source (bright target)
limit_vis_det_temp	Color Counts (see below)	None	Input limit checking on Vis sensor array temperature
input_scene_counts	Limited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Input statistics on scene data numbers
input_bb_counts	Limited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Input statistics on data numbers from the blackbody (dark target)
input_phot_counts	Limited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Input statistics on data numbers from the photometric calibration source (bright target)
input_vis_det_temp	Limited Engineering Struct (see below)	None	Input statistics on Vis sensor array temperature
limit_offsets	Color Counts (see below)	Channel (= 4) * SubTrack (= 9)	Output limit checking on offsets
offset_stats	Unlimited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Statistics on offsets
offset_unc_stats	Unlimited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Statistics on offset uncertainties
gain_scan	16-bit unsigned integer	None	Scanline number of (first) gain calculation completed in granule. 0 for no gain calculation completed in this granule.
gain_TAI	64-bit floating-point	None	TAI time of (first) gain calculation. (floating-point elapsed seconds since start of 1993) 0.0 for no gain calculation completed in this granule.
gain_TAI_prev	64-bit floating-point	Bulb (= 3) * GainHistory (= 5)	TAI time of previous valid gain calculation on each bulb. (floating-point elapsed seconds since start of 1993)
gain_num	16-bit integer	None	Number of gain calculations in this granule. (Should always be 0 or 1)
gain_bulb	16-bit integer	None	bulb number (1, 2, or 3) of bulb used for (first) gain calculation (including gain calculations started but not completed). 0 for no gain calculation occurred in this granule.
bulb_failed	8-bit integer	None	1 if a bulb failure was detected in this granule, 0 otherwise.
gain	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Gain: number of radiance units per count. (Same as gain_prev on most recently used bulb when no gain calculation was performed in this granule)
gain_err	32-bit floating-point	Channel (= 4) *	Error caused by imperfect fit for gain (gain units) (Same as gain_err_prev on most

	point	SubTrack (= 9)	recently used bulb when no gain calculation was performed in this granule)
gain_prev	32-bit floating-point	Bulb (= 3) * GainHistory (= 5) * Channel (= 4) * SubTrack (= 9)	Previous Gain: number of radiance units per count at time of previous gain calculations for each bulb
gain_err_prev	32-bit floating-point	Bulb (= 3) * GainHistory (= 5) * Channel (= 4) * SubTrack (= 9)	gain_err for each gain_prev
gain_start_TAI	64-bit floating-point	None	TAI time when photometric calibration source was turned "on" for a gain calculation that had started but had not finished collecting data at the end of the granule. (floating-point elapsed seconds since start of 1993) 0.0 for no gain calculation left partial at the end of this granule.
gain_num_counts	32-bit integer	Channel (= 4) * SubTrack (= 9)	The number of data points of counts per detector collected in gain_sum_counts and gain_num_counts2 for a gain calculation that had started but had not finished collecting data at the end of the granule. 0.0 for no gain calculation left partial at the end of this granule.
gain_sum_counts	64-bit floating-point	Channel (= 4) * SubTrack (= 9)	The sum of the counts per detector for a gain calculation that had started but had not finished collecting data at the end of the granule. 0.0 for no gain calculation left partial at the end of this granule.
gain_sum_counts2	64-bit floating-point	Channel (= 4) * SubTrack (= 9)	The sum of the squares of counts per detector for a gain calculation that had started but had not finished collecting data at the end of the granule. 0.0 for no gain calculation left partial at the end of this granule.
primary_bulb	16-bit integer	None	Bulb number of photometric calibration source used as primary bulb (1, 2, or 3; 0 for no primary bulb)
secondary_bulb	16-bit integer	None	Bulb number of photometric calibration source used as secondary bulb (1, 2, or 3; 0 for no secondary bulb)
backup_bulb	16-bit integer	None	Bulb number of photometric calibration source used as backup bulb (1, 2, or 3; 0 for no backup bulb)
K21	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Gain calculated using bulb 2, divided by gain using bulb 1. (Tracks degradation of bulb 1 relative to bulb 2.)
K32	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Gain calculated using bulb 3, divided by gain using bulb 2. (Tracks degradation of bulb 2 relative to bulb 3.)
K31	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Gain calculated using bulb 3, divided by gain using bulb 1. (Tracks degradation of bulb 1 relative to bulb 3.)
K_factors_applied	8-bit unsigned integer	Channel (= 4)	Flag if K factors were applied for each channel (1 for yes, 0 for no)
gamma_ground	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Correction factor applied to gain calculation based on observations of known ground targets
gamma_MODIS	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Correction factor applied to gain calculation based on co-located MODIS and AIRS observations
rad_stats	Unlimited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Statistics on radiances (radiance units)
granules_present	string of 8-bit characters	None	Zero-terminated character string denoting which adjacent granules were available for smoothing ("All" for both previous & next, "Prev" for previous but not next, "Next" for next but not previous, "None" for neither previous nor next)
xtrack_err	32-bit floating-point	Channel (= 4)	cross-track pixel location error estimate per channel (km)
track_err	32-bit floating-point	Channel (= 4)	Along-track pixel location error estimate per channel (km)
align_1_2_nadir	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-nadir AIRS footprints (45 & 46) between VIS channels 1 & 2
align_2_3_nadir	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-nadir AIRS footprints (45 & 46) between VIS channels 2 & 3
align_2_4_nadir	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-nadir AIRS footprints (45 & 46) between VIS channels 2 & 4
align_1_2_maxang	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-limb AIRS footprints (1 & 90) between VIS channels 1 & 2
align_2_3_maxang	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-limb AIRS footprints (1 & 90) between VIS channels 2 & 3
align_2_4_maxang	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-limb AIRS footprints (1 & 90) between VIS channels 2 & 4
align_vis_airs	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-nadir AIRS footprints (45 & 46) between the AIRS center and all VIS channels

Size: 29912 bytes (0.0 MB) per granule

Along-Track Data Fields

These fields appear once per scanline (GeoTrack times)

Name	Type	Extra Dimensions	Explanation
offset	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Offset: number of counts expected for no radiance at time nadirTAI
offset_err	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Error caused by imperfect fit for offset (radiance units)
NeN	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Noise-equivalent Radiance (radiance units)
satheight	32-bit floating-point	None	Satellite altitude at nadirTAI in km above reference ellipsoid (e.g. 725.2)
satroll	32-bit floating-point	None	Satellite attitude roll angle at nadirTAI (-180.0 ... 180.0 angle about the +x (roll) ORB axis, +x axis is positively oriented in the direction of orbital flight completing an orthogonal triad with y and z.)
satpitch	32-bit floating-point	None	Satellite attitude pitch angle at nadirTAI (-180.0 ... 180.0 angle about +y (pitch) ORB axis. +y axis is oriented normal to the orbit plane with the positive sense opposite to that of the orbit's angular momentum vector H.)
satyaw	32-bit floating-point	None	Satellite attitude yaw angle at nadirTAI (-180.0 ... 180.0 angle about +z (yaw) axis. +z axis is positively oriented earthward parallel to the satellite radius vector R from the spacecraft center of mass to the center of the Earth.)
satgeoqa	32-bit unsigned integer	None	Satellite Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAItUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAItUTC() returned PGS_E_TOOLKIT; bit 3: PGS_EPH_EphemAttit() returned PGSEPH_W_BAD_EPHEM_VALUE; bit 4: PGS_EPH_EphemAttit() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 5: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 6: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_DATA_REQUESTED; bit 7: PGS_EPH_EphemAttit() returned PGSTD_E_SC_TAG_UNKNOWN; bit 8: PGS_EPH_EphemAttit() returned PGSEPH_E_BAD_ARRAY_SIZE; bit 9: PGS_EPH_EphemAttit() returned PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_EPH_EphemAttit() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_EPH_EphemAttit() returned PGSTD_E_NO_LEAP_SECS; bit 12: PGS_EPH_EphemAttit() returned PGS_E_TOOLKIT; bit 13: PGS_CSC_ECIttoECR() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 14: PGS_CSC_ECIttoECR() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_ECIttoECR() returned PGSTD_E_NO_LEAP_SECS; bit 16: PGS_CSC_ECIttoECR() returned PGSTD_E_TIME_FMT_ERROR; bit 17: PGS_CSC_ECIttoECR() returned PGSTD_E_TIME_VALUE_ERROR; bit 18: unused (set to zero); bit 19: PGS_CSC_ECIttoECR() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_ECIttoECR() returned PGS_E_TOOLKIT; bit 21: PGS_CSC_ECRtoGEO() returned PGSCSC_W_TOO_MANY_ITERS; bit 22: PGS_CSC_ECRtoGEO() returned PGSCSC_W_INVALID_ALTITUDE; bit 23: PGS_CSC_ECRtoGEO() returned PGSCSC_W_SPHERE_BODY; bit 24: PGS_CSC_ECRtoGEO() returned PGSCSC_W_LARGE_FLATTENING; bit 25: PGS_CSC_ECRtoGEO() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 26: PGS_CSC_ECRtoGEO() returned PGSCSC_E_BAD_EARTH_MODEL; bit 27: PGS_CSC_ECRtoGEO() returned PGS_E_TOOLKIT; bit 28-31: not used
glintgeoqa	16-bit unsigned integer	None	Glint Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: glint location in Earth's shadow; bit 2: glint calculation not converging; bit 3: glint location sun vs. satellite zenith mismatch; bit 4: glint location sun vs. satellite azimuth mismatch; bit 5: bad glint location; bit 6: PGS_CSC_ZenithAzimuth() returned any 'W' class return code; bit 7: PGS_CSC_ZenithAzimuth() returned any 'E' class return code; bit 8: PGS_CBP_Earth_CB_Vector() returned returned any 'W' class return code; bit 9: PGS_CBP_Earth_CB_Vector() returned returned any 'E' class return code; bit 10: PGS_CSC_ECIttoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1 (for Glint); bit 11: PGS_CSC_ECIttoECR() returned any 'E' class return code (for Glint); bit 12: PGS_CSC_ECRtoGEO() returned any 'W' class return code (for Glint); bit 13: PGS_CSC_ECRtoGEO() returned any 'E' class return code (for Glint); bit 14: PGS_CSC_ECIttoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_ECIttoECR() returned any 'E' class return code
moongeoqa	16-bit unsigned integer	None	Moon Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAItUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAItUTC() returned PGS_E_TOOLKIT; bit 3: PGS_CBP_Sat_CB_Vector() returned PGSCSC_W_BELOW_SURFACE; bit 4: PGS_CBP_Sat_CB_Vector() returned PGSCBP_W_BAD_CB_VECTOR; bit 5: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_BAD_ARRAY_SIZE; bit 6: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_INVALID_CB_ID; bit 7: PGS_CBP_Sat_CB_Vector() returned PGSMEM_E_NO_MEMORY; bit 8: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_UNABLE_TO_OPEN_FILE; bit 9: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_BAD_INITIAL_TIME; bit 10: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_TIME_OUT_OF_RANGE; bit 11: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_SC_TAG_UNKNOWN; bit 12: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 13: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 14: PGS_CBP_Sat_CB_Vector() returned PGS_E_TOOLKIT; bit 15: not used
nadirTAI	64-bit floating-point	None	TAI time at which instrument is nominally looking directly down. (between footprints 15 & 16 for AMSU or between footprints 45 & 46 for AIRS/Vis & HSB) (floating-point elapsed seconds since start of 1993)

sat_lat	64-bit floating-point	None	Satellite geodetic latitude in degrees North (-90.0 ... 90.0)
sat_lon	64-bit floating-point	None	Satellite geodetic longitude in degrees East (-180.0 ... 180.0)
scan_node_type	8-bit integer	None	'A' for ascending, 'D' for descending, 'N' for North-Polar, 'S' for South-Polar
glintlat	32-bit floating-point	None	Solar glint geodetic latitude in degrees North at nadirTAI (-90.0 ... 90.0)
glintlon	32-bit floating-point	None	Solar glint geodetic longitude in degrees East at nadirTAI (-180.0 ... 180.0)
ViSnsrArrTemp	32-bit floating-point	None	Vis/NIR Sensor Array Temperature (Celcius)
ScHeadTemp1	32-bit floating-point	None	Scanner Head Housing Temperature 1 (active A or B) (Celcius)
OpMode	16-bit unsigned integer	None	Instrument Operations Mode. See AIRS Command Handbook, section 6.4 for a definition of each bit. bits 0 (LSB)-2 cal phase; bits 3-6 Cal Func; bit 7 quicklook (expedited) flag; bits 8-11 submode bits 12-14 Mode (0=standby, 1=ready, 2=operate, 3=checkout, 4=decontaminate, 5=off, 6=survival); bit 16 transition flag

Size: 67365 bytes (0.1 MB) per 45-scanset granule

Full Swath Data Fields

These fields appear for every footprint of every scanline in the granule (GeoTrack * GeoXTrack times)

Name	Type	Extra Dimensions	Explanation
radiances	32-bit floating-point	Channel (= 4) * SubTrack (= 9) * SubXTrack (= 8)	Radiances for each channel in Watts/m**2/micron/steradian (Channel 1: ~0.40 micron; Ch 2: ~0.6 micron; Ch 3: ~0.8 micron; Ch 4: broadband)
PrelimCldQA	8-bit integer	None	Cloud QA index (0-good or 1-bad) -1 for not calculated
PrelimCldPrcVis	8-bit integer	None	Cloud Percent (0...100) -1 for not calculated
PrelimCldPrcVisErr	8-bit integer	None	Cloud Fraction Error (0...100) -1 for not calculated
PrelimClrPrcVis	8-bit integer	None	Clear Fraction (0...100) -1 for not calculated
PrelimClrPrcVisErr	8-bit integer	None	Clear Fraction Error (0...100) -1 for not calculated
PrelimCldMapVis	8-bit integer	SubTrack (= 9) * SubXTrack (= 8)	Cloud Map (0-clear, 1-cloudy) -1 for not calculated
PrelimNDVI	32-bit floating-point	SubTrack (= 9) * SubXTrack (= 8)	Vegetation Index (-1.0 to 1.0) -999.0 for not calculated
bright_index	16-bit integer	None	Brightness index (0...5, 5 is brightest. -9999 for not calculated)
inhomo_index	16-bit integer	None	Inhomogeneity index (0...64, 1st digit NDVI-Dev, 2nd digit Ch1-Dev, -9999 for not calculated)
scanang	32-bit floating-point	None	Scanning angle of AIRS instrument with respect to the AIRS Instrument for this footprint (-180.0 ... 180.0, negative at start of scan, 0 at nadir)
ftptgeoqa	32-bit unsigned integer	None	Footprint Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAItoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAItoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_MISS_EARTH; bit 4: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_SC_TAG_UNKNOWN; bit 5: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_ZERO_PIXEL_VECTOR; bit 6: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_EPH_FOR_PIXEL; bit 7: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_INSTRUMENT_OFF_BOARD; bit 8: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_ACCURACY_FLAG; bit 9: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 10: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 11: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DATA_FILE_MISSING; bit 12: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_NEG_OR_ZERO_RAD; bit 13: PGS_CSC_GetFOV_Pixel() returned PGSMEM_E_NO_MEMORY; bit 14: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_LEAP_SECS; bit 15: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_FMT_ERROR; bit 16: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_VALUE_ERROR; bit 17: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_PREDICTED_UT1; bit 18: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_UT1_VALUE; bit 19: PGS_CSC_GetFOV_Pixel() returned PGS_E_TOOLKIT; bit 20: PGS_CSC_GetFOV_Pixel() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 21: PGS_CSC_GetFOV_Pixel() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 22-31: not used
zengeoqa	16-bit unsigned integer	None	Satellite zenith Geolocation QA flags: bit 0 (LSB): (Spacecraft) bad input value; bit 1: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_BELOW_HORIZON; bit 2: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 3: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_NO_REFRACTION; bit 4: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_INVALID_VECTAG; bit 5: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_LOOK_PT_ALTIT_RANGE; bit 6: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 7: PGS_CSC_ZenithAzimuth(S/C) returned PGS_E_TOOLKIT; bit 8: (Sun) bad input value; bit 9: (sunpressed)

			PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_BELOW_HORIZON (This is not an error condition - the sun is below the horizon at night); bit 10: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 11: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_NO_REFRACTION; bit 12: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_INVALID_VECTAG; bit 13: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_LOOK_PT_ALTIT_RANGE; bit 14: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 15: PGS_CSC_ZenithAzimuth(Sun) returned PGS_E_TOOLKIT
demgeoqa	16-bit unsigned integer	None	Digital Elevation Model (DEM) Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: Could not allocate memory; bit 2: Too close to North or South pole. Excluded; bit 3: Layer resolution incompatibility. Excluded; bit 4: Any DEM Routine (elev) returned PGSDM_E_IMPROPER_TAG; bit 5: Any DEM Routine (elev) returned PGSDM_E_CANNOT_ACCESS_DATA; bit 6: Any DEM Routine (land/water) returned PGSDM_E_IMPROPER_TAG; bit 7: Any DEM Routine (land/water) returned PGSDM_E_CANNOT_ACCESS_DATA; bit 8: Reserved for future layers; bit 9: Reserved for future layers; bit 10: PGS_DEM_GetRegion(elev) returned PGSDM_M_FILLVALUE_INCLUDED; bit 11: PGS_DEM_GetRegion(land/water) returned PGSDM_M_FILLVALUE_INCLUDED; bit 12: Reserved for future layers; bit 13: PGS_DEM_GetRegion(all) returned PGSDM_M_MULTIPLE_RESOLUTIONS; bit 14: PGS_CSC_GetFOV_Pixel() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_GetFOV_Pixel() returned any 'E' class return code
satzen	32-bit floating-point	None	Spacecraft zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
satazi	32-bit floating-point	None	Spacecraft azimuth angle (-180.0 ... 180.0) degrees E of N GEO
solzen	32-bit floating-point	None	Solar zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
solazi	32-bit floating-point	None	Solar azimuth angle (-180.0 ... 180.0) degrees E of N GEO
sun_glint_distance	16-bit integer	None	Distance (km) from footprint center to location of the sun glint (-9999 for unknown, 30000 for no glint visible because spacecraft is in Earth's shadow)
topog	32-bit floating-point	None	Mean topography in meters above reference ellipsoid
topog_err	32-bit floating-point	None	Error estimate for topog
landFrac	32-bit floating-point	None	Fraction of spot that is land (0.0 ... 1.0)
landFrac_err	32-bit floating-point	None	Error estimate for landFrac
state	32-bit integer	None	Data state: 0:Process, 1:Special, 2:Erroneous, 3:Missing
cornerlats	32-bit floating-point	GeoLocationsPerSpot (= 4) * Channel (= 4)	Geodetic Latitudes at the centers of the pixels at the corners of the IR footprint by channel in degrees North (-90.0 ... 90.0)
cornerlons	32-bit floating-point	GeoLocationsPerSpot (= 4) * Channel (= 4)	Geodetic Longitudes at the centers of the pixels at the corners of the IR footprint by channel in degrees East (-180.0 ... 180.0)

Size: 20642850 bytes (20.6 MB) per 45-scanset granule

**Total File Size (plus storage for dimensions and other HDF-EOS overhead):
21031727 bytes (21.0 MB) per 45-scanset granule = 5047.6 MB per day**

Special AIRS Types

Limited Engineering Struct: This type is used for engineering data fields for which there are known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num_in = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num_in = 0)
mean	32-bit floating-point	Mean of in-range values field takes on in granule (not valid when num_in = 0)
dev	32-bit floating-point	Standard Deviation of in-range values field takes on in granule (not valid when num_in = 0)
num_in	32-bit integer	Count of in-range values field takes on in granule

num_lo	32-bit integer	Count of out-of-range low values field takes on in granule
num_hi	32-bit integer	Count of out-of-range high values field takes on in granule
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
range_min	32-bit floating-point	Minimum in-range value. Any value less than this is counted in num_lo and is not used in the calculation of mean & dev.
range_max	32-bit floating-point	Maximum in-range value. Any value greater than this is counted in num_hi and is not used in the calculation of mean & dev.
missing	8-bit integer	Missing limits flags. Bit 0 (LSB) is 1 when yellow low (range_min) limit is missing; Bit 1 is high when yellow high (range_max) limit is missing; other bits unused, set to 0.
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

Unlimited Engineering Struct: This type is used for engineering data fields for which there are NOT known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num = 0)
mean	32-bit floating-point	Mean of values field takes on in granule (not valid when num = 0)
dev	32-bit floating-point	Standard Deviation of values field takes on in granule (not valid when num = 0)
num	32-bit integer	Count of occurrences of field in granule (not including those counted in num_bad)
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

Color Counts: This type tracks counts of values received during an interval by how they compare to corresponding "red" and "yellow" limits

Field Name	Type	Explanation
red_lo_limit	32-bit floating-point	Value of the low "red" limit.
red_lo_cnt	32-bit integer	Count of values less than the low "red" limit. This is an "Alarm" condition.
to_red_lo	32-bit integer	Count of occasions on which the "color" of this field changed from some other value to "red_low".
yellow_lo_limit	32-bit floating-point	Value of the low "yellow" limit.
yellow_lo_cnt	32-bit integer	Count of values greater than the low "red" limit but less than the low "yellow" limit. This is a "Warning" condition.
to_yellow_lo	32-bit integer	Count of occasions on which the "color" of this field changed from some other value to "yellow_low".
green_cnt	32-bit integer	Count of values greater than the low "yellow" limit but less than the high "yellow" limit.
to_green	32-bit integer	Count of occasions on which the "color" of this field changed from some other value to "green".
yellow_hi_limit	32-bit floating-point	Value of the high "yellow" limit.
yellow_hi_cnt	32-bit integer	Count of values greater than the high "yellow" limit but less than the high "red" limit. This is a "Warning" condition.
to_yellow_hi	32-bit integer	Count of occasions on which the "color" of this field changed from some other value to "yellow_high".
red_hi_limit	32-bit floating-point	Value of the high "red" limit.
red_hi_cnt	32-bit integer	Count of values greater than the high "red" limit. This is an "Alarm" condition.
to_red_hi	32-bit integer	Count of occasions on which the "color" of this field changed from some other value to "red_high".
missing	8-bit integer	Missing limits flags. Bit 0 (LSB) is 1 when yellow low limit (yellow_lo_limit) is missing; Bit 1 is high when yellow high limit is missing; Bit 2 is 1 when red low limit is missing; Bit 3 is 1 when red high limit is missing; Other bits unused set to 0.

A-4. L1B Visible/NIR QA Interface Specification

Interface Specification Version 2.7.12.0
2003-03-03

ESDT ShortName = "AIRVBQAP"

Swath Name = "L1B_VIS_QA"

Level = "level1B"

Footprints = 90

scanlines per scanset = 3

Dimensions

These fields define all dimensions that can be used for HDF-EOS swath fields.

The names "GeoTrack" and "GeoXTrack" have a special meaning for this document: "Cross-Track" data fields have a hidden dimension of "GeoXTrack"; "Along-Track" data fields have a hidden dimension of "GeoTrack"; "Full Swath Data Fields" have hidden dimensions of both "GeoTrack" and "GeoXTrack".

Name	Value	Explanation
GeoXTrack	90	Dimension across track for footprint positions. Same as number of footprints per scanline. -- starting at the left and increasing towards the right as you look along the satellite's path
GeoTrack	# of scan lines in swath	Dimension along track for footprint positions. Same as number of scanlines in granule. Parallel to the satellite's path, increasing with time. (Nominally 45 for Level-2, AMSU-A, and AIRS/Vis low-rate engineering; 135 for AIRS/Vis and HSB high-rate quantities)
SubTrack	9	VIS detector elements per AIRS footprint along track (9). Direction is the same as GeoTrack -- parallel to the satellite's path, increasing with time. (opposite order to detector ordering -- detector 0 is last)
SubXTrack	8	VIS samples per AIRS footprint across track (8). Direction is the same as GeoXTrack -- starting at the left and increasing towards the right as you look along the satellite's path
Bulb	3	Number of photometric calibration sources (light bulbs) that can be used as sources for photometric calibration (3)
GainHistory	5	Number of photometric gain calculations to store for use in smoothing of gain (5)
GeoLocationsPerSpot	4	Geolocations for the 4 corner pixels in the order: trailing first scanned; trailing last-scanned; leading first-scanned; leading last-scanned. Each footprint also has a central geolocation associated with the swath geolocation lat/lon/time of the footprint.
Channel	4	Dimension of radiance array

Geolocation Fields

These fields appear for every footprint (GeoTrack * GeoXTrack times) and correspond to footprint center coordinates and "shutter" time.

Name	Explanation
Latitude	Footprint boresight geodetic Latitude in degrees North (-90.0 ... 90.0)
Longitude	Footprint boresight geodetic Longitude in degrees East (-180.0 ... 180.0)
Time	Footprint "shutter" TAI Time: floating-point elapsed seconds since Jan 1, 1993

Size: 291600 bytes (0.3 MB) per 45-scanset granule

Attributes

These fields appear only once per granule

Name	Type	Extra Dimensions	Explanation
processing_level	string of 8-bit characters	None	Zero-terminated character string denoting processing level ("level1B")
instrument	string of 8-bit characters	None	Zero-terminated character string denoting instrument ("VIS")
DayNightFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule as day and/or night: (Always "Day", "Night", or "Both")
AutomaticQAFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule data quality: (Always "Passed", "Failed", or "Suspect")
NumTotalData	32-bit integer	None	Total number of expected scene footprints
NumProcessData	32-bit integer	None	Number of scene footprints which are present and can be processed routinely (state = 0)

NumSpecialData	32-bit integer	None	Number of scene footprints which are present and can be processed only as a special test (state = 1)
NumBadData	32-bit integer	None	Number of scene footprints which are present but cannot be processed (state = 2)
NumMissingData	32-bit integer	None	Number of expected scene footprints which are not present (state = 3)
NumLandSurface	32-bit integer	None	Number of scene footprints for which the surface is more than 90% land
NumOceanSurface	32-bit integer	None	Number of scene footprints for which the surface is less than 10% land
node_type	string of 8-bit characters	None	Zero-terminated character string denoting whether granule is ascending, descending, or pole-crossing: ("Ascending" and "Descending" for entirely ascending or entirely descending granules, or "NorthPole" or "SouthPole" for pole-crossing granules)
start_year	32-bit integer	None	Year in which granule started, UTC (e.g. 1999)
start_month	32-bit integer	None	Month in which granule started, UTC (1 ... 12)
start_day	32-bit integer	None	Day of month in which granule started, UTC (1 ... 31)
start_hour	32-bit integer	None	Hour of day in which granule started, UTC (0 ... 23)
start_minute	32-bit integer	None	Minute of hour in which granule started, UTC (0 ... 59)
start_sec	32-bit floating-point	None	Second of minute in which granule started, UTC (0.0 ... 59.0)
start_orbit	32-bit integer	None	Orbit number of mission in which granule started
end_orbit	32-bit integer	None	Orbit number of mission in which granule ended
orbit_path	32-bit integer	None	Orbit path of start orbit (1 ... 233 as defined by EOS project)
start_orbit_row	32-bit integer	None	Orbit row at start of granule (1 ... 248 as defined by EOS project)
end_orbit_row	32-bit integer	None	Orbit row at end of granule (1 ... 248 as defined by EOS project)
granule_number	32-bit integer	None	Number of granule within day (1 ... 240)
num_scansets	32-bit integer	None	Number of scansets in granule (1 ... 45)
num_scanlines	32-bit integer	None	Number of scanlines in granule (3 * num_scansets)
start_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at start of granule in degrees North (-90.0 ... 90.0)
start_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at start of granule in degrees East (-180.0 ... 180.0)
start_Time	64-bit floating-point	None	TAI Time at start of granule (floating-point elapsed seconds since start of 1993)
end_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at end of granule in degrees North (-90.0 ... 90.0)
end_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at end of granule in degrees East (-180.0 ... 180.0)
end_Time	64-bit floating-point	None	TAI Time at end of granule (floating-point elapsed seconds since start of 1993)
eq_x_longitude	32-bit floating-point	None	Longitude of spacecraft at southward equator crossing nearest granule start in degrees East (-180.0 ... 180.0)
eq_x_tai	64-bit floating-point	None	Time of eq_x_longitude in TAI units (floating-point elapsed seconds since start of 1993)
orbitgeoqa	32-bit unsigned integer	None	Orbit Geolocation QA: bit 0 (LSB): bad input value (last scanline); bit 1: bad input value (first scanline); bit 2: PGS_EPH_GetEphMet() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 3: PGS_EPH_GetEphMet() returned PGSEPH_E_BAD_ARRAY_SIZE; bit 4: PGS_EPH_GetEphMet() returned PGSTD_E_TIME_FMT_ERROR; bit 5: PGS_EPH_GetEphMet() returned PGSTD_E_TIME_VALUE_ERROR; bit 6: PGS_EPH_GetEphMet() returned PGSTD_E_SC_TAG_UNKNOWN; bit 7: PGS_EPH_GetEphMet() returned PGS_E_TOOLKIT; bit 8: PGS_TD_UTCToTAI() returned PGSTD_E_NO_LEAP_SECS; bit 9: PGS_TD_UTCToTAI() returned PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_TD_UTCToTAI() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_TD_UTCToTAI() returned PGS_E_TOOLKIT; bit 12: PGS_CSC_DayNight() returned PGSTD_E_NO_LEAP_SECS; bit 13: PGS_CSC_DayNight() returned PGSCSC_E_INVALID_LIMITTAG; bit 14: PGS_CSC_DayNight() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_DayNight() returned PGSCSC_W_ERROR_IN_DAYNIGHT; bit 16: PGS_CSC_DayNight() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 17: PGS_CSC_DayNight() returned PGSCSC_W_BELOW_HORIZON; bit 18: PGS_CSC_DayNight() returned PGSCSC_W_PREDICTED_UT1; bit 19: PGS_CSC_DayNight() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_DayNight() returned PGSTD_E_BAD_INITIAL_TIME; bit 21: PGS_CSC_DayNight() returned PGSCBP_E_TIME_OUT_OF_RANGE; bit 22: PGS_CSC_DayNight() returned PGSCBP_E_UNABLE_TO_OPEN_FILE; bit 23: PGS_CSC_DayNight() returned PGSMEM_E_NO_MEMORY; bit 24: PGS_CSC_DayNight() returned PGS_E_TOOLKIT; bit 25-31: not used
num_satgeoqa	16-bit integer	None	Number of scans with problems in satgeoqa

num_glintgeoqa	16-bit integer	None	Number of scans with problems in glintgeoqa
num_moongeoqa	16-bit integer	None	Number of scans with problems in moongeoqa
num_ftptgeoqa	16-bit integer	None	Number of footprints with problems in ftptgeoqa
num_zengeoqa	16-bit integer	None	Number of footprints with problems in zengeoqa
num_demgeoqa	16-bit integer	None	Number of footprints with problems in demgeoqa
num_fpe	16-bit integer	None	Number of floating point errors
LonGranuleCen	16-bit integer	None	Geodetic Longitude of the center of the granule in degrees East (-180 ... 180)
LatGranuleCen	16-bit integer	None	Geodetic Latitude of the center of the granule in degrees North (-90 ... 90)
LocTimeGranuleCen	16-bit integer	None	Local solar time at the center of the granule in minutes past midnight (0 ... 1439)
VegMapFileName	string of 8-bit characters	None	Name of AVHRR input file used as Vegetation Map
limit_scene_counts	Color Counts (see below)	Channel (= 4) * SubTrack (= 9)	Input limit checking on scene data numbers
limit_bb_counts	Color Counts (see below)	Channel (= 4) * SubTrack (= 9)	Input limit checking on data numbers from the blackbody (dark target)
limit_phot_counts	Color Counts (see below)	Channel (= 4) * SubTrack (= 9)	Input limit checking on data numbers from the photometric calibration source (bright target)
limit_vis_det_temp	Color Counts (see below)	None	Input limit checking on Vis sensor array temperature
input_scene_counts	Limited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Input statistics on scene data numbers
input_bb_counts	Limited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Input statistics on data numbers from the blackbody (dark target)
input_phot_counts	Limited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Input statistics on data numbers from the photometric calibration source (bright target)
input_vis_det_temp	Limited Engineering Struct (see below)	None	Input statistics on Vis sensor array temperature
limit_offsets	Color Counts (see below)	Channel (= 4) * SubTrack (= 9)	Output limit checking on offsets
offset_stats	Unlimited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Statistics on offsets
offset_unc_stats	Unlimited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Statistics on offset uncertainties
gain_scan	16-bit unsigned integer	None	Scanline number of (first) gain calculation completed in granule. 0 for no gain calculation completed in this granule.
gain_TAI	64-bit floating-point	None	TAI time of (first) gain calculation. (floating-point elapsed seconds since start of 1993) 0.0 for no gain calculation completed in this granule.
gain_TAI_prev	64-bit floating-point	Bulb (= 3) * GainHistory (= 5)	TAI time of previous valid gain calculation on each bulb. (floating-point elapsed seconds since start of 1993)
gain_num	16-bit integer	None	Number of gain calculations in this granule. (Should always be 0 or 1)
gain_bulb	16-bit integer	None	bulb number (1, 2, or 3) of bulb used for (first) gain calculation (including gain calculations started but not completed). 0 for no gain calculation occurred in this granule.
bulb_failed	8-bit integer	None	1 if a bulb failure was detected in this granule, 0 otherwise.
gain	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Gain: number of radiance units per count. (Same as gain_prev on most recently used bulb when no gain calculation was performed in this granule)
gain_err	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Error caused by imperfect fit for gain (gain units). (Same as gain_err_prev on most recently used bulb when no gain calculation was performed in this granule)
gain_prev	32-bit floating-point	Bulb (= 3) * GainHistory (= 5) * Channel (= 4) * SubTrack (= 9)	Previous Gain: number of radiance units per count at time of previous gain calculations for each bulb
gain_err_prev	32-bit floating-point	Bulb (= 3) *	gain_err for each gain_prev

	point	GainHistory (= 5) * Channel (= 4) * SubTrack (= 9)	
gain_start_TAI	64-bit floating-point	None	TAI time when photometric calibration source was turned "on" for a gain calculation that had started but had not finished collecting data at the end of the granule. (floating-point elapsed seconds since start of 1993) 0.0 for no gain calculation left partial at the end of this granule.
gain_num_counts	32-bit integer	Channel (= 4) * SubTrack (= 9)	The number of data points of counts per detector collected in gain_sum_counts and gain_num_counts2 for a gain calculation that had started but had not finished collecting data at the end of the granule. 0.0 for no gain calculation left partial at the end of this granule.
gain_sum_counts	64-bit floating-point	Channel (= 4) * SubTrack (= 9)	The sum of the counts per detector for a gain calculation that had started but had not finished collecting data at the end of the granule. 0.0 for no gain calculation left partial at the end of this granule.
gain_sum_counts2	64-bit floating-point	Channel (= 4) * SubTrack (= 9)	The sum of the squares of counts per detector for a gain calculation that had started but had not finished collecting data at the end of the granule. 0.0 for no gain calculation left partial at the end of this granule.
primary_bulb	16-bit integer	None	Bulb number of photometric calibration source used as primary bulb (1, 2, or 3; 0 for no primary bulb)
secondary_bulb	16-bit integer	None	Bulb number of photometric calibration source used as secondary bulb (1, 2, or 3; 0 for no secondary bulb)
backup_bulb	16-bit integer	None	Bulb number of photometric calibration source used as backup bulb (1, 2, or 3; 0 for no backup bulb)
K21	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Gain calculated using bulb 2, divided by gain using bulb 1. (Tracks degradation of bulb 1 relative to bulb 2.)
K32	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Gain calculated using bulb 3, divided by gain using bulb 2. (Tracks degradation of bulb 2 relative to bulb 3.)
K31	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Gain calculated using bulb 3, divided by gain using bulb 1. (Tracks degradation of bulb 1 relative to bulb 3.)
K_factors_applied	8-bit unsigned integer	Channel (= 4)	Flag if K factors were applied for each channel (1 for yes, 0 for no)
gamma_ground	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Correction factor applied to gain calculation based on observations of known ground targets
gamma_MODIS	32-bit floating-point	Channel (= 4) * SubTrack (= 9)	Correction factor applied to gain calculation based on co-located MODIS and AIRS observations
rad_stats	Unlimited Engineering Struct (see below)	Channel (= 4) * SubTrack (= 9)	Statistics on radiances (radiance units)
granules_present	string of 8-bit characters	None	Zero-terminated character string denoting which adjacent granules were available for smoothing ("All" for both previous & next, "Prev" for previous but not next, "Next" for next but not previous, "None" for neither previous nor next)
xtrack_err	32-bit floating-point	Channel (= 4)	cross-track pixel location error estimate per channel (km)
track_err	32-bit floating-point	Channel (= 4)	Along-track pixel location error estimate per channel (km)
align_1_2_nadir	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-nadir AIRS footprints (45 & 46) between VIS channels 1 & 2
align_2_3_nadir	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-nadir AIRS footprints (45 & 46) between VIS channels 2 & 3
align_2_4_nadir	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-nadir AIRS footprints (45 & 46) between VIS channels 2 & 4
align_1_2_maxang	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-limb AIRS footprints (1 & 90) between VIS channels 1 & 2
align_2_3_maxang	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-limb AIRS footprints (1 & 90) between VIS channels 2 & 3
align_2_4_maxang	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-limb AIRS footprints (1 & 90) between VIS channels 2 & 4
align_vis_airs	32-bit floating-point	None	Expected error (km) between the pixel locations for the corner locations of near-nadir AIRS footprints (45 & 46) between the AIRS center and all VIS channels

Size: 29904 bytes (0.0 MB) per granule

Along-Track Data Fields

These fields appear once per scanline (GeoTrack times)

Name	Type	Extra Dimensions	Explanation
satheight	32-bit floating-point	None	Satellite altitude at nadirTAI in km above reference ellipsoid (e.g. 725.2)
satroll	32-bit floating-point	None	Satellite attitude roll angle at nadirTAI (-180.0 ... 180.0 angle about the +x (roll) ORB axis, +x axis is positively oriented in the direction of orbital flight completing an orthogonal triad with y and z.)
satpitch	32-bit floating-point	None	Satellite attitude pitch angle at nadirTAI (-180.0 ... 180.0 angle about +y (pitch) ORB axis. +y axis is oriented normal to the orbit plane with the positive sense opposite to that of the orbit's angular momentum vector H.)
satyaw	32-bit floating-point	None	Satellite attitude yaw angle at nadirTAI (-180.0 ... 180.0 angle about +z (yaw) axis. +z axis is positively oriented earthward parallel to the satellite radius vector R from the spacecraft center of mass to the center of the Earth.)
satgeoqa	32-bit unsigned integer	None	Satellite Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAItUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAItUTC() returned PGS_E_TOOLKIT; bit 3: PGS_EPH_EphemAttit() returned PGSEPH_W_BAD_EPHEM_VALUE; bit 4: PGS_EPH_EphemAttit() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 5: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 6: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_DATA_REQUESTED; bit 7: PGS_EPH_EphemAttit() returned PGSTD_E_SC_TAG_UNKNOWN; bit 8: PGS_EPH_EphemAttit() returned PGSEPH_E_BAD_ARRAY_SIZE; bit 9: PGS_EPH_EphemAttit() returned PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_EPH_EphemAttit() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_EPH_EphemAttit() returned PGSTD_E_NO_LEAP_SECS; bit 12: PGS_EPH_EphemAttit() returned PGS_E_TOOLKIT; bit 13: PGS_CSC_ECIttoECR() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 14: PGS_CSC_ECIttoECR() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_ECIttoECR() returned PGSTD_E_NO_LEAP_SECS; bit 16: PGS_CSC_ECIttoECR() returned PGSTD_E_TIME_FMT_ERROR; bit 17: PGS_CSC_ECIttoECR() returned PGSTD_E_TIME_VALUE_ERROR; bit 18: unused (set to zero); bit 19: PGS_CSC_ECIttoECR() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_ECIttoECR() returned PGS_E_TOOLKIT; bit 21: PGS_CSC_ECRtoGEO() returned PGSCSC_W_TOO_MANY_ITERS; bit 22: PGS_CSC_ECRtoGEO() returned PGSCSC_W_INVALID_ALTITUDE; bit 23: PGS_CSC_ECRtoGEO() returned PGSCSC_W_SPHERE_BODY; bit 24: PGS_CSC_ECRtoGEO() returned PGSCSC_W_LARGE_FLATTENING; bit 25: PGS_CSC_ECRtoGEO() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 26: PGS_CSC_ECRtoGEO() returned PGSCSC_E_BAD_EARTH_MODEL; bit 27: PGS_CSC_ECRtoGEO() returned PGS_E_TOOLKIT; bit 28-31: not used
glintgeoqa	16-bit unsigned integer	None	Glint Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: glint location in Earth's shadow; bit 2: glint calculation not converging; bit 3: glint location sun vs. satellite zenith mismatch; bit 4: glint location sun vs. satellite azimuth mismatch; bit 5: bad glint location; bit 6: PGS_CSC_ZenithAzimuth() returned any 'W' class return code; bit 7: PGS_CSC_ZenithAzimuth() returned any 'E' class return code; bit 8: PGS_CBP_Earth_CB_Vector() returned returned any 'W' class return code; bit 9: PGS_CBP_Earth_CB_Vector() returned returned any 'E' class return code; bit 10: PGS_CSC_ECIttoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1 (for Glint); bit 11: PGS_CSC_ECIttoECR() returned any 'E' class return code (for Glint); bit 12: PGS_CSC_ECRtoGEO() returned any 'W' class return code (for Glint); bit 13: PGS_CSC_ECRtoGEO() returned any 'E' class return code (for Glint); bit 14: PGS_CSC_ECIttoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_ECIttoECR() returned any 'E' class return code
moongeoa	16-bit unsigned integer	None	Moon Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAItUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAItUTC() returned PGS_E_TOOLKIT; bit 3: PGS_CBP_Sat_CB_Vector() returned PGSCSC_W_BELOW_SURFACE; bit 4: PGS_CBP_Sat_CB_Vector() returned PGSCBP_W_BAD_CB_VECTOR; bit 5: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_BAD_ARRAY_SIZE; bit 6: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_INVALID_CB_ID; bit 7: PGS_CBP_Sat_CB_Vector() returned PGSMEM_E_NO_MEMORY; bit 8: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_UNABLE_TO_OPEN_FILE; bit 9: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_BAD_INITIAL_TIME; bit 10: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_TIME_OUT_OF_RANGE; bit 11: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_SC_TAG_UNKNOWN; bit 12: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 13: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 14: PGS_CBP_Sat_CB_Vector() returned PGS_E_TOOLKIT; bit 15: not used
nadirTAI	64-bit floating-point	None	TAI time at which instrument is nominally looking directly down. (between footprints 15 & 16 for AMSU or between footprints 45 & 46 for AIRS/Vis & HSB) (floating-point elapsed seconds since start of 1993)
sat_lat	64-bit floating-point	None	Satellite geodetic latitude in degrees North (-90.0 ... 90.0)
sat_lon	64-bit floating-point	None	Satellite geodetic longitude in degrees East (-180.0 ... 180.0)
scan_node_type	8-bit integer	None	'A' for ascending, 'D' for descending, 'N' for North-Polar, 'S' for South-Polar
glintlat	32-bit floating-point	None	Solar glint geodetic latitude in degrees North at nadirTAI (-90.0 ... 90.0)
glintlon	32-bit floating-point	None	Solar glint geodetic longitude in degrees East at nadirTAI (-180.0 ... 180.0)

	point		
ViSnrArrTemp	32-bit floating-point	None	Vis/NIR Sensor Array Temperature (Celcius)
ScHeadTemp1	32-bit floating-point	None	Scanner Head Housing Temperature 1 (active A or B) (Celcius)
OpMode	16-bit unsigned integer	None	Instrument Operations Mode. See AIRS Command Handbook, section 6.4 for a definition of each bit. bits 0 (LSB)-2 cal phase; bits 3-6 Cal Func; bit 7 quicklook (expedited) flag; bits 8-11 submode bits 12-14 Mode (0=standby, 1=ready, 2=operate, 3=checkout, 4=decontaminate, 5=off, 6=survival); bit 16 transition flag

Size: 9045 bytes (0.0 MB) per 45-scanset granule

Full Swath Data Fields

These fields appear for every footprint of every scanline in the granule (GeoTrack * GeoXTrack times)

Name	Type	Extra Dimensions	Explanation
scanang	32-bit floating-point	None	Scanning angle of AIRS instrument with respect to the AIRS Instrument for this footprint (-180.0 ... 180.0, negative at start of scan, 0 at nadir)
ftptgeoqa	32-bit unsigned integer	None	Footprint Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAItoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAItoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_MISS_EARTH; bit 4: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_SC_TAG_UNKNOWN; bit 5: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_ZERO_PIXEL_VECTOR; bit 6: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_EPH_FOR_PIXEL; bit 7: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_INSTRUMENT_OFF_BOARD; bit 8: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_ACCURACY_FLAG; bit 9: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 10: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 11: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DATA_FILE_MISSING; bit 12: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_NEG_OR_ZERO_RAD; bit 13: PGS_CSC_GetFOV_Pixel() returned PGSMEM_E_NO_MEMORY; bit 14: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_LEAP_SECS; bit 15: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_FMT_ERROR; bit 16: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_VALUE_ERROR; bit 17: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_PREDICTED_UT1; bit 18: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_UT1_VALUE; bit 19: PGS_CSC_GetFOV_Pixel() returned PGS_E_TOOLKIT; bit 20: PGS_CSC_GetFOV_Pixel() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 21: PGS_CSC_GetFOV_Pixel() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 22-31: not used
zengeoqa	16-bit unsigned integer	None	Satellite zenith Geolocation QA flags: bit 0 (LSB): (Spacecraft) bad input value; bit 1: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_BELOW_HORIZON; bit 2: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 3: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_NO_REFRACTION; bit 4: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_INVALID_VECTAG; bit 5: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_LOOK_PT_ALTIT_RANGE; bit 6: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 7: PGS_CSC_ZenithAzimuth(S/C) returned PGS_E_TOOLKIT; bit 8: (Sun) bad input value; bit 9: (suppressed) PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_BELOW_HORIZON (This is not an error condition - the sun is below the horizon at night); bit 10: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 11: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_NO_REFRACTION; bit 12: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_INVALID_VECTAG; bit 13: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_LOOK_PT_ALTIT_RANGE; bit 14: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 15: PGS_CSC_ZenithAzimuth(Sun) returned PGS_E_TOOLKIT
demgeoqa	16-bit unsigned integer	None	Digital Elevation Model (DEM) Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: Could not allocate memory; bit 2: Too close to North or South pole. Excluded; bit 3: Layer resolution incompatibility. Excluded; bit 4: Any DEM Routine (elev) returned PGSDDEM_E_IMPROPER_TAG; bit 5: Any DEM Routine (elev) returned PGSDDEM_E_CANNOT_ACCESS_DATA; bit 6: Any DEM Routine (land/water) returned PGSDDEM_E_IMPROPER_TAG; bit 7: Any DEM Routine (land/water) returned PGSDDEM_E_CANNOT_ACCESS_DATA; bit 8: Reserved for future layers; bit 9: Reserved for future layers; bit 10: PGS_DEM_GetRegion(elev) returned PGSDDEM_M_FILLVALUE_INCLUDED; bit 11: PGS_DEM_GetRegion(land/water) returned PGSDDEM_M_FILLVALUE_INCLUDED; bit 12: Reserved for future layers; bit 13: PGS_DEM_GetRegion(all) returned PGSDDEM_M_MULTIPLE_RESOLUTIONS; bit 14: PGS_CSC_GetFOV_Pixel() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_GetFOV_Pixel() returned any 'E' class return code
satzen	32-bit floating-point	None	Spacecraft zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
satazi	32-bit floating-point	None	Spacecraft azimuth angle (-180.0 ... 180.0) degrees E of N GEO)
solzen	32-bit floating-point	None	Solar zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
solazi	32-bit floating-point	None	Solar azimuth angle (-180.0 ... 180.0) degrees E of N GEO)

sun_glint_distance	16-bit integer	None	Distance (km) from footprint center to location of the sun glint (-9999 for unknown, 30000 for no glint visible because spacecraft is in Earth's shadow)
topog	32-bit floating-point	None	Mean topography in meters above reference ellipsoid
topog_err	32-bit floating-point	None	Error estimate for topog
landFrac	32-bit floating-point	None	Fraction of spot that is land (0.0 ... 1.0)
landFrac_err	32-bit floating-point	None	Error estimate for landFrac
state	32-bit integer	None	Data state: 0:Process, 1:Special, 2:Erroneous, 3:Missing

Size: 607500 bytes (0.6 MB) per 45-scanset granule

Total File Size (plus storage for dimensions and other HDF-EOS overhead): 938049 bytes (0.9 MB) per 45-scanset granule = 225.1 MB per day

Special AIRS Types

Limited Engineering Struct: This type is used for engineering data fields for which there are known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num_in = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num_in = 0)
mean	32-bit floating-point	Mean of in-range values field takes on in granule (not valid when num_in = 0)
dev	32-bit floating-point	Standard Deviation of in-range values field takes on in granule (not valid when num_in = 0)
num_in	32-bit integer	Count of in-range values field takes on in granule
num_lo	32-bit integer	Count of out-of-range low values field takes on in granule
num_hi	32-bit integer	Count of out-of-range high values field takes on in granule
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
range_min	32-bit floating-point	Minimum in-range value. Any value less than this is counted in num_lo and is not used in the calculation of mean & dev.
range_max	32-bit floating-point	Maximum in-range value. Any value greater than this is counted in num_hi and is not used in the calculation of mean & dev.
missing	8-bit integer	Missing limits flags. Bit 0 (LSB) is 1 when yellow low (range_min) limit is missing; Bit 1 is high when yellow high (range_max) limit is missing; other bits unused, set to 0.
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

Unlimited Engineering Struct: This type is used for engineering data fields for which there are NOT known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num = 0)
mean	32-bit floating-point	Mean of values field takes on in granule (not valid when num = 0)
dev	32-bit floating-point	Standard Deviation of values field takes on in granule (not valid when num = 0)
num	32-bit integer	Count of occurrences of field in granule (not including those counted in num_bad)
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

Color Counts: This type tracks counts of values received during an interval by how they compare to corresponding "red" and "yellow" limits

Field Name	Type	Explanation
red_lo_limit	32-bit floating-point	Value of the low "red" limit.
red_lo_cnt	32-bit integer	Count of values less than the low "red" limit. This is an "Alarm" condition.
to_red_lo	32-bit integer	Count of occasions on which the "color" of this field changed from some other value to "red_low".
yellow_lo_limit	32-bit floating-point	Value of the low "yellow" limit.
yellow_lo_cnt	32-bit integer	Count of values greater than the low "red" limit but less than the low "yellow" limit. This is a "Warning" condition.
to_yellow_lo	32-bit integer	Count of occasions on which the "color" of this field changed from some other value to "yellow_low".
green_cnt	32-bit integer	Count of values greater than the low "yellow" limit but less than the high "yellow" limit.
to_green	32-bit integer	Count of occasions on which the "color" of this field changed from some other value to "green".
yellow_hi_limit	32-bit floating-point	Value of the high "yellow" limit.
yellow_hi_cnt	32-bit integer	Count of values greater than the high "yellow" limit but less than the high "red" limit. This is a "Warning" condition.
to_yellow_hi	32-bit integer	Count of occasions on which the "color" of this field changed from some other value to "yellow_high".
red_hi_limit	32-bit floating-point	Value of the high "red" limit.
red_hi_cnt	32-bit integer	Count of values greater than the high "red" limit. This is an "Alarm" condition.
to_red_hi	32-bit integer	Count of occasions on which the "color" of this field changed from some other value to "red_high".
missing	8-bit integer	Missing limits flags. Bit 0 (LSB) is 1 when yellow low limit (yellow_lo_limit) is missing; Bit 1 is high when yellow high limit is missing; Bit 2 is 1 when red low limit is missing; Bit 3 is 1 when red high limit is missing; Other bits unused set to 0.

A-5. L1B AMSU-A Science Interface Specification

Interface Specification Version 2.7.12.0
2003-03-03

ESDT ShortName = "AIRABRAD"

Swath Name = "L1B_AMSU"

Level = "level1B"

Footprints = 30

scanlines per scanset = 1

Dimensions

These fields define all dimensions that can be used for HDF-EOS swath fields.

The names "GeoTrack" and "GeoXTrack" have a special meaning for this document: "Cross-Track" data fields have a hidden dimension of "GeoXTrack"; "Along-Track" data fields have a hidden dimension of "GeoTrack"; "Full Swath Data Fields" have hidden dimensions of both "GeoTrack" and "GeoXTrack".

Name	Value	Explanation
GeoXTrack	30	Dimension across track for footprint positions. Same as number of footprints per scanline. -- starting at the left and increasing towards the right as you look along the satellite's path
GeoTrack	# of scan lines in swath	Dimension along track for footprint positions. Same as number of scanlines in granule. Parallel to the satellite's path, increasing with time. (Nominally 45 for Level-2, AMSU-A, and AIRS/Vis low-rate engineering; 135 for AIRS/Vis and HSB high-rate quantities)
Channel	15	Dimension of radiance array
CalXTrack	4	Dimension "across" track for calibration footprint positions. Same as number of calibration footprints per scanline. (NUM_FOOTPRINTS_AMSU_CALIB) (Footprints are ordered: 1-2: spaceviews; 3-4: blackbody radiometric calibration source)
SpaceXTrack	2	Dimension "across" track for spaceview calibration footprint positions in order of observation time. (NUM_FOOTPRINTS_AMSU_SPACE)
BBXTrack	2	Dimension "across" track for blackbody calibration footprint positions in order of observation time. (NUM_FOOTPRINTS_AMSU_BB)
WarmPRTA11	5	Number of PRTs measuring AMSU-A1-1 warm target
WarmPRTA12	5	Number of PRTs measuring AMSU-A1-2 warm target
WarmPRTA2	7	Number of PRTs measuring AMSU-A2 warm target

Geolocation Fields

These fields appear for every footprint (GeoTrack * GeoXTrack times) and correspond to footprint center coordinates and "shutter" time.

Name	Explanation
Latitude	Footprint boresight geodetic Latitude in degrees North (-90.0 ... 90.0)
Longitude	Footprint boresight geodetic Longitude in degrees East (-180.0 ... 180.0)
Time	Footprint "shutter" TAI Time: floating-point elapsed seconds since Jan 1, 1993

Size: 32400 bytes (0.0 MB) per 45-scanset granule

Attributes

These fields appear only once per granule

Name	Type	Extra Dimensions	Explanation
processing_level	string of 8-bit characters	None	Zero-terminated character string denoting processing level ("level1B")
instrument	string of 8-bit characters	None	Zero-terminated character string denoting instrument ("AMSU-A")
DayNightFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule as day and/or night: (Always "Day", "Night", or "Both")
AutomaticQAFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule data quality: (Always "Passed", "Failed", or "Suspect")
NumTotalData	32-bit integer	None	Total number of expected channels * scene FOVs
NumProcessData	32-bit integer	None	Number of channels * scene FOVs which are present and can be processed routinely (state = 0)

NumSpecialData	32-bit integer	None	Number of channels * scene FOVs which are present and can be processed only as a special test (state = 1)
NumBadData	32-bit integer	None	Number of channels * scene FOVs which are present but cannot be processed (state = 2)
NumMissingData	32-bit integer	None	Number of expected channels * scene FOVs which are not present (state = 3)
NumLandSurface	32-bit integer	None	Number of scene footprints for which the surface is more than 90% land
NumOceanSurface	32-bit integer	None	Number of scene footprints for which the surface is less than 10% land
node_type	string of 8-bit characters	None	Zero-terminated character string denoting whether granule is ascending, descending, or pole-crossing: ("Ascending" and "Descending" for entirely ascending or entirely descending granules, or "NorthPole" or "SouthPole" for pole-crossing granules)
start_year	32-bit integer	None	Year in which granule started, UTC (e.g. 1999)
start_month	32-bit integer	None	Month in which granule started, UTC (1 ... 12)
start_day	32-bit integer	None	Day of month in which granule started, UTC (1 ... 31)
start_hour	32-bit integer	None	Hour of day in which granule started, UTC (0 ... 23)
start_minute	32-bit integer	None	Minute of hour in which granule started, UTC (0 ... 59)
start_sec	32-bit floating-point	None	Second of minute in which granule started, UTC (0.0 ... 59.0)
start_orbit	32-bit integer	None	Orbit number of mission in which granule started
end_orbit	32-bit integer	None	Orbit number of mission in which granule ended
orbit_path	32-bit integer	None	Orbit path of start orbit (1 ... 233 as defined by EOS project)
start_orbit_row	32-bit integer	None	Orbit row at start of granule (1 ... 248 as defined by EOS project)
end_orbit_row	32-bit integer	None	Orbit row at end of granule (1 ... 248 as defined by EOS project)
granule_number	32-bit integer	None	Number of granule within day (1 ... 240)
num_scansets	32-bit integer	None	Number of scansets in granule (1 ... 45)
num_scanlines	32-bit integer	None	Number of scanlines in granule (1 * num_scansets)
start_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at start of granule in degrees North (-90.0 ... 90.0)
start_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at start of granule in degrees East (-180.0 ... 180.0)
start_Time	64-bit floating-point	None	TAI Time at start of granule (floating-point elapsed seconds since start of 1993)
end_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at end of granule in degrees North (-90.0 ... 90.0)
end_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at end of granule in degrees East (-180.0 ... 180.0)
end_Time	64-bit floating-point	None	TAI Time at end of granule (floating-point elapsed seconds since start of 1993)
eq_x_longitude	32-bit floating-point	None	Longitude of spacecraft at southward equator crossing nearest granule start in degrees East (-180.0 ... 180.0)
eq_x_tai	64-bit floating-point	None	Time of eq_x_longitude in TAI units (floating-point elapsed seconds since start of 1993)
orbitgeoqa	32-bit unsigned integer	None	Orbit Geolocation QA: bit 0 (LSB): bad input value (last scanline); bit 1: bad input value (first scanline); bit 2: PGS_EPH_GetEphMet() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 3: PGS_EPH_GetEphMet() returned PGSEPH_E_BAD_ARRAY_SIZE; bit 4: PGS_EPH_GetEphMet() returned PGSTD_E_TIME_FMT_ERROR; bit 5: PGS_EPH_GetEphMet() returned PGSTD_E_TIME_VALUE_ERROR; bit 6: PGS_EPH_GetEphMet() returned PGSTD_E_SC_TAG_UNKNOWN; bit 7: PGS_EPH_GetEphMet() returned PGS_E_TOOLKIT; bit 8: PGS_TD_UTCtoTAI() returned PGSTD_E_NO_LEAP_SECS; bit 9: PGS_TD_UTCtoTAI() returned PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_TD_UTCtoTAI() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_TD_UTCtoTAI() returned PGS_E_TOOLKIT; bit 12: PGS_CSC_DayNight() returned PGSTD_E_NO_LEAP_SECS; bit 13: PGS_CSC_DayNight() returned PGSCSC_E_INVALID_LIMITTAG; bit 14: PGS_CSC_DayNight() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_DayNight() returned PGSCSC_W_ERROR_IN_DAYNIGHT; bit 16: PGS_CSC_DayNight() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 17: PGS_CSC_DayNight() returned PGSCSC_W_BELOW_HORIZON; bit 18: PGS_CSC_DayNight() returned PGSCSC_W_PREDICTED_UT1; bit 19: PGS_CSC_DayNight() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_DayNight() returned PGSTD_E_BAD_INITIAL_TIME; bit 21: PGS_CSC_DayNight() returned PGSCBP_E_TIME_OUT_OF_RANGE; bit 22: PGS_CSC_DayNight() returned PGSCBP_E_UNABLE_TO_OPEN_FILE

			bit 22: PGS_CSC_DayNight() returned PGSMEM_E_NO_MEMORY; bit 24: PGS_CSC_DayNight() returned PGS_E_TOOLKIT; bit 25-31: not used
num_satgeoqa	16-bit integer	None	Number of scans with problems in satgeoqa
num_glintgeoqa	16-bit integer	None	Number of scans with problems in glintgeoqa
num_moongoqa	16-bit integer	None	Number of scans with problems in moongoqa
num_ftptgeoqa	16-bit integer	None	Number of footprints with problems in ftptgeoqa
num_zengeoqa	16-bit integer	None	Number of footprints with problems in zengeoqa
num_demgeoqa	16-bit integer	None	Number of footprints with problems in demgeoqa
num_fpe	16-bit integer	None	Number of floating point errors
LonGranuleCen	16-bit integer	None	Geodetic Longitude of the center of the granule in degrees East (-180 ... 180)
LatGranuleCen	16-bit integer	None	Geodetic Latitude of the center of the granule in degrees North (-90 ... 90)
LocTimeGranuleCen	16-bit integer	None	Local solar time at the center of the granule in minutes past midnight (0 ... 1439)
center_freq	32-bit floating-point	Channel (= 15)	Channel Center frequency (GHz)
IF_offset_1	32-bit floating-point	Channel (= 15)	Offset of first intermediate frequency stage (MHz) (zero for no mixing)
IF_offset_2	32-bit floating-point	Channel (= 15)	Offset of second intermediate frequency stage (MHz) (zero for no second mixing)
bandwidth	32-bit floating-point	Channel (= 15)	bandwidth of sum of 1, 2, or 4 channels (MHz)
num_scanlines_not_norm_mode_a1	32-bit integer	None	Number of scanlines not in Process state (AMSU-A1)
num_scanlines_not_norm_mode_a2	32-bit integer	None	Number of scanlines not in Process state (AMSU-A2)
num_calibrated_scanlines	32-bit integer	Channel (= 15)	Number of scanlines that had calibration coefs applied
num_missing_scanlines_a1	32-bit integer	None	Number of scanlines with state = missing (AMSU-A1)
num_missing_scanlines_a2	32-bit integer	None	Number of scanlines with state = missing (AMSU-A2)
num_data_gaps_a1	32-bit integer	None	Number of blocks of scanlines where State is not Process (AMSU-A1)
num_data_gaps_a2	32-bit integer	None	Number of blocks of scanlines where State is not Process (AMSU-A2)
num_instr_mode_changes_a1	32-bit integer	None	Number of operational instrument mode changes (AMSU-A1)
num_instr_mode_changes_a2	32-bit integer	None	Number of operational instrument mode changes (AMSU-A2)
num_scanlines_rec_cal_prob_a11	32-bit integer	None	Number of scanlines with non-zero qa_receiver (AMSU-A1-1)
num_scanlines_rec_cal_prob_a12	32-bit integer	None	Number of scanlines with non-zero qa_receiver (AMSU-A1-2)
num_scanlines_rec_cal_prob_a2	32-bit integer	None	Number of scanlines with non-zero qa_receiver (AMSU-A2)
num_scanlines_ch_cal_problems	32-bit integer	Channel (= 15)	Number of scanlines with non-zero qa_channel
num_scanlines_sig_coast_xing	32-bit integer	None	Number of scanlines with qa_scanline coast crossing bit set
num_scanlines_sig_sun_glint	32-bit integer	None	Number of scanlines with qa_scanline sun glint bit set
MoonInViewMWCount	32-bit integer	None	Number of scanlines in granule with the moon in the AMSU-A1 space view plus number of scanlines in granule with the moon in the AMSU-A2 space view (0-90)
QA_unfiltered_scene_count	Unlimited Engineering Struct (see below)	GeoXTrack (= 30) * Channel (= 15)	Per footprint position raw scene count summary QA
QA_unfiltered_BB_count	Unlimited Engineering Struct (see below)	BBXTrack (= 2) * Channel (= 15)	Per BB footprint position raw warm count summary QA (unfiltered)
QA_unfiltered_space_count	Unlimited Engineering Struct (see below)	SpaceXTrack (= 2) * Channel (= 15)	Per space footprint position raw cold count summary QA (unfiltered)
QA_bb_PRT_a11	Limited Engineering Struct (see below)	None	Blackbody PRT temperature summary QA (AMSU-A1-1) (C)
QA_bb_PRT_a12	Limited Engineering Struct (see below)	None	Blackbody PRT temperature summary QA (AMSU-A1-2) (C)

QA_bb_PRT_a2	Limited Engineering Struct (see below)	None	Blackbody PRT temperature summary QA (AMSU-A2) (C)
QA_rec_PRT_a11	Limited Engineering Struct (see below)	None	Receiver PRT temperature summary QA (AMSU-A1-1) (C)
QA_rec_PRT_a12	Limited Engineering Struct (see below)	None	Receiver PRT temperature summary QA (AMSU-A1-2) (C)
QA_rec_PRT_a2	Limited Engineering Struct (see below)	None	Receiver PRT temperature summary QA (AMSU-A2) (C)
QA_cal_coef_a0	Unlimited Engineering Struct (see below)	Channel (= 15)	Calibration coefficient a0 summary QA (K)
QA_cal_coef_a1	Unlimited Engineering Struct (see below)	Channel (= 15)	Calibration coefficient a1 summary QA (K/count)
QA_cal_coef_a2	Unlimited Engineering Struct (see below)	Channel (= 15)	Calibration coefficient a2 summary QA (K/count**2)
QA_bb_raw_noise_counts	Unlimited Engineering Struct (see below)	Channel (= 15)	Summary QA on differences between warm cal counts
QA_sv_raw_noise_counts	Unlimited Engineering Struct (see below)	Channel (= 15)	Summary QA on differences between cold cal counts
QA_NeDT	Unlimited Engineering Struct (see below)	Channel (= 15)	Summary QA on gain * differences between warm cal counts (K)
QA_NeDT2NomRatio	Unlimited Engineering Struct (see below)	Channel (= 15)	Summary QA on gain * differences between warm cal counts over nominal NeDT (unitless)
granules_present	string of 8-bit characters	None	Zero-terminated character string denoting which adjacent granules were available for smoothing ("All" for both previous & next, "Prev" for previous but not next, "Next" for next but not previous, "None" for neither previous nor next)

Size: 35510 bytes (0.0 MB) per granule

Along-Track Data Fields

These fields appear once per scanline (GeoTrack times)

Name	Type	Extra Dimensions	Explanation
satheight	32-bit floating-point	None	Satellite altitude at nadirTAI in km above reference ellipsoid (e.g. 725.2)
satroll	32-bit floating-point	None	Satellite attitude roll angle at nadirTAI (-180.0 ... 180.0 angle about the +x (roll) ORB axis, +x axis is positively oriented in the direction of orbital flight completing an orthogonal triad with y and z.)
satpitch	32-bit floating-point	None	Satellite attitude pitch angle at nadirTAI (-180.0 ... 180.0 angle about +y (pitch) ORB axis. +y axis is oriented normal to the orbit plane with the positive sense opposite to that of the orbit's angular momentum vector H.)
satyaw	32-bit floating-point	None	Satellite attitude yaw angle at nadirTAI (-180.0 ... 180.0 angle about +z (yaw) axis. +z axis is positively oriented earthward parallel to the satellite radius vector R from the spacecraft center of mass to the center of the Earth.)
satgeoqa	32-bit unsigned integer	None	Satellite Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAItoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAItoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_EPH_EphemAttit() returned PGSEPH_W_BAD_EPHEM_VALUE; bit 4: PGS_EPH_EphemAttit() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 5: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 6: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_DATA_REQUESTED; bit 7: PGS_EPH_EphemAttit() returned PGSTD_E_SC_TAG_UNKNOWN; bit 8: PGS_EPH_EphemAttit() returned PGSEPH_E_RAD_ARRAY_SIZE; bit 9: PGS_EPH_EphemAttit() returned

			PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_EPH_EphemAttit() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_EPH_EphemAttit() returned PGSTD_E_NO_LEAP_SECS; bit 12: PGS_EPH_EphemAttit() returned PGS_E_TOOLKIT; bit 13: PGS_CSC_ECIttoECR() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 14: PGS_CSC_ECIttoECR() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_ECIttoECR() returned PGSTD_E_NO_LEAP_SECS; bit 16: PGS_CSC_ECIttoECR() returned PGSTD_E_TIME_FMT_ERROR; bit 17: PGS_CSC_ECIttoECR() returned PGSTD_E_TIME_VALUE_ERROR; bit 18: unused (set to zero); bit 19: PGS_CSC_ECIttoECR() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_ECIttoECR() returned PGS_E_TOOLKIT; bit 21: PGS_CSC_ECRtoGEO() returned PGSCSC_W_TOO_MANY_ITERS; bit 22: PGS_CSC_ECRtoGEO() returned PGSCSC_W_INVALID_ALTITUDE; bit 23: PGS_CSC_ECRtoGEO() returned PGSCSC_W_SPHERE_BODY; bit 24: PGS_CSC_ECRtoGEO() returned PGSCSC_W_LARGE_FLATTENING; bit 25: PGS_CSC_ECRtoGEO() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 26: PGS_CSC_ECRtoGEO() returned PGSCSC_E_BAD_EARTH_MODEL; bit 27: PGS_CSC_ECRtoGEO() returned PGS_E_TOOLKIT; bit 28-31: not used
glintgeoqa	16-bit unsigned integer	None	Glnt Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: glint location in Earth's shadow; bit 2: glint calculation not converging; bit 3: glint location sun vs. satellite zenith mismatch; bit 4: glint location sun vs. satellite azimuth mismatch; bit 5: bad glint location; bit 6: PGS_CSC_ZenithAzimuth() returned any 'W' class return code; bit 7: PGS_CSC_ZenithAzimuth() returned any 'E' class return code; bit 8: PGS_CBP_Earth_CB_Vector() returned returned any 'W' class return code; bit 9: PGS_CBP_Earth_CB_Vector() returned returned any 'E' class return code; bit 10: PGS_CSC_ECIttoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1 (for Glint); bit 11: PGS_CSC_ECIttoECR() returned any 'E' class return code (for Glint); bit 12: PGS_CSC_ECRtoGEO() returned any 'W' class return code (for Glint); bit 13: PGS_CSC_ECRtoGEO() returned any 'E' class return code (for Glint); bit 14: PGS_CSC_ECIttoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_ECIttoECR() returned any 'E' class return code
moongeoqa	16-bit unsigned integer	None	Moon Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAltoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAltoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_CBP_Sat_CB_Vector() returned PGSCSC_W_BELOW_SURFACE; bit 4: PGS_CBP_Sat_CB_Vector() returned PGSCBP_W_BAD_CB_VECTOR; bit 5: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_BAD_ARRAY_SIZE; bit 6: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_INVALID_CB_ID; bit 7: PGS_CBP_Sat_CB_Vector() returned PGSMEM_E_NO_MEMORY; bit 8: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_UNABLE_TO_OPEN_FILE; bit 9: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_BAD_INITIAL_TIME; bit 10: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_TIME_OUT_OF_RANGE; bit 11: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_SC_TAG_UNKNOWN; bit 12: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 13: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 14: PGS_CBP_Sat_CB_Vector() returned PGS_E_TOOLKIT; bit 15: not used
nadirTAI	64-bit floating-point	None	TAI time at which instrument is nominally looking directly down. (between footprints 15 & 16 for AMSU or between footprints 45 & 46 for AIRS/Vis & HSB) (floating-point elapsed seconds since start of 1993)
sat_lat	64-bit floating-point	None	Satellite geodetic latitude in degrees North (-90.0 ... 90.0)
sat_lon	64-bit floating-point	None	Satellite geodetic longitude in degrees East (-180.0 ... 180.0)
scan_node_type	8-bit integer	None	'A' for ascending, 'D' for descending, 'N' for North-Polar, 'S' for South-Polar
glintlat	32-bit floating-point	None	Solar glint geodetic latitude in degrees North at nadirTAI (-90.0 ... 90.0)
glintlon	32-bit floating-point	None	Solar glint geodetic longitude in degrees East at nadirTAI (-180.0 ... 180.0)
state1	32-bit integer	None	Data state for AMSU-A1: 0:Process, 1:Special, 2:Erroneous, 3:Missing
state2	32-bit integer	None	Data state for AMSU-A2: 0:Process, 1:Special, 2:Erroneous, 3:Missing
cal_coef_a0	32-bit floating-point	Channel (= 15)	Calibration coefficients to convert raw counts to antenna temperature (K)
cal_coef_a1	32-bit floating-point	Channel (= 15)	Calibration coefficients to convert raw counts to antenna temperature (K/count)
cal_coef_a2	32-bit floating-point	Channel (= 15)	Calibration coefficients to convert raw counts to antenna temperature (K/count**2)
cal_coef_a0_err	32-bit floating-point	Channel (= 15)	Error estimate for cal_coef_a0 (K)
cal_coef_a1_err	32-bit floating-point	Channel (= 15)	Error estimate for cal_coef_a1 (K/count)
cal_coef_a2_err	32-bit floating-point	Channel (= 15)	Error estimate for cal_coef_a2 (K/count**2)
a1_ColdCalPstion	8-bit integer	None	AMSU-A1 Cold Calibration Position 1-4 (Binary 0-3)
a2_ColdCalPstion	8-bit integer	None	AMSU-A2 Cold Calibration Position 1-4 (Binary 0-3)
a1_PLO_Redundncy	8-bit integer	None	AMSU-A1 PLO Redundancy, 1: default (PLO 2); 0: redundant (PLO 1)

a11_mux_temp_used	8-bit integer	None	AMSU-A1-1 MUX Temperature use flag. (1: used MUX temperature for AMSU-A1 receiver temperature; 0: used RF shelf temperature)
a11_receiver_temp	32-bit floating-point	None	AMSU-A1-1 receiver temperature used in calibration (MUX temperature or RF shelf temperature as specified by a11_mux_temp_used) (C)
a11_target_temp	32-bit floating-point	None	AMSU-A1-1 target temperature used in calibration (C)
a12_mux_temp_used	8-bit integer	None	AMSU-A1-2 MUX Temperature use flag. (1: used MUX temperature for AMSU-A1 receiver temperature; 0: used RF shelf temperature)
a12_receiver_temp	32-bit floating-point	None	AMSU-A1-2 receiver temperature used in calibration (MUX temperature or RF shelf temperature as specified by a12_mux_temp_used) (C)
a12_target_temp	32-bit floating-point	None	AMSU-A1-2 target temperature used in calibration (C)
a2_diplexer_temp_used	8-bit integer	None	AMSU-A2 diplexer Temperature use flag. (1: used diplexer temperature for AMSU-A2 receiver temperature; 0: used RF shelf temperature)
a2_receiver_temp	32-bit floating-point	None	AMSU-A2 receiver temperature used in calibration (diplexer temperature or RF shelf temperature as specified by a2_mux_temp_used) (C)
a2_target_temp	32-bit floating-point	None	AMSU-A2 target temperature used in calibration (C)
qa_scanline	8-bit unsigned integer	None	Scanline bitmap for AMSU-A: Bit 0: Sun glint in this scanline; Bit 1: Coastal crossing in this scanline; Bit 2: Some channels had excessive NeDT estimate; Bit 3: Near sidelobe correction applied
qa_receiver_a11	8-bit unsigned integer	None	Receiver bitmap for AMSU-A1-1: Bit 0: Calibration was not derived, due to the instrument mode; Bit 1: Calibration was not derived, due to bad or missing PRT values; Bit 2: This scanline was calibrated, but the moon was in the space view; Bit 3: This scanline was calibrated, but there was a space view scan position error; Bit 4: This scanline was calibrated, but there was a blackbody scan position error; Bit 5: This scanline was calibrated, but some PRT values were bad or marginal; Bit 6: This scanline was calibrated, but there was a data gap; Bit 7: Some channels were not calibrated
qa_receiver_a12	8-bit unsigned integer	None	Receiver bitmap for AMSU-A1-2: Same fields as defined for qa_receiver_a11
qa_receiver_a2	8-bit unsigned integer	None	Receiver bitmap for AMSU-A2: Same fields as defined for qa_receiver_a11
qa_channel	8-bit unsigned integer	Channel (= 15)	Channel bitmap for AMSU-A: Bit 0: All space view counts were bad for this channel and scanline; Bit 1: Space view counts were marginal for this channel and scanline; Bit 2: Space view counts could not be smoothed; Bit 3: All blackbody counts were bad for this channel and scanline; Bit 4: Blackbody counts were marginal for this channel and scanline; Bit 5: Blackbody counts could not be smoothed; Bit 6: Unable to calculate calibration coefficients for this scanline, most recent valid coefficients used instead; Bit 7: Excessive NeDT estimated

Size: 21330 bytes (0.0 MB) per 45-scanset granule

Full Swath Data Fields

These fields appear for every footprint of every scanline in the granule (GeoTrack * GeoXTrack times)

Name	Type	Extra Dimensions	Explanation
scanang	32-bit floating-point	None	Scanning angle of AMSU-A instrument with respect to the AMSU-A Instrument for this footprint (-180.0 ... 180.0, negative at start of scan, 0 at nadir)
ftptgeoqa	32-bit unsigned integer	None	Footprint Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAtoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAtoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_MISS_EARTH; bit 4: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_SC_TAG_UNKNOWN; bit 5: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_ZERO_PIXEL_VECTOR; bit 6: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_EPH_FOR_PIXEL; bit 7: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_INSTRUMENT_OFF_BOARD; bit 8: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_ACCURACY_FLAG; bit 9: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 10: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 11: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DATA_FILE_MISSING; bit 12: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_NEG_OR_ZERO_RAD; bit 13: PGS_CSC_GetFOV_Pixel() returned PGSMEM_E_NO_MEMORY; bit 14: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_LEAP_SECS; bit 15: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_FMT_ERROR; bit 16: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_VALUE_ERROR; bit 17: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_PREDICTED_UT1; bit 18: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_UT1_VALUE; bit 19: PGS_CSC_GetFOV_Pixel() returned PGS_E_TOOLKIT; bit 20: PGS_CSC_GetFOV_Pixel() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 21: PGS_CSC_GetFOV_Pixel() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 22-31: not used
zengeoqa	16-bit unsigned integer	None	Satellite zenith Geolocation QA flags: bit 0 (LSB): (Spacecraft) bad input value; bit 1: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_BELOW_HORIZON; bit 2: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 3: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_NO_REFRACTION; bit 4: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_INVALID_VECTAG; bit 5: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_LOOK_PT_AITIT_RANGE; bit 6:

			PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 7: PGS_CSC_ZenithAzimuth(S/C) returned PGS_E_TOOLKIT; bit 8: (Sun) bad input value; bit 9: (suppressed) PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_BELOW_HORIZON (This is not an error condition - the sun is below the horizon at night); bit 10: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 11: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_NO_REFRACTION; bit 12: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_INVALID_VECTAG; bit 13: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_LOOK_PT_ALTIT_RANGE; bit 14: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 15: PGS_CSC_ZenithAzimuth(Sun) returned PGS_E_TOOLKIT
demgeoqa	16-bit unsigned integer	None	Digital Elevation Model (DEM) Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: Could not allocate memory; bit 2: Too close to North or South pole. Excluded; bit 3: Layer resolution incompatibility. Excluded; bit 4: Any DEM Routine (elev) returned PGSDM_E_IMPROPER_TAG; bit 5: Any DEM Routine (elev) returned PGSDM_E_CANNOT_ACCESS_DATA; bit 6: Any DEM Routine (land/water) returned PGSDM_E_IMPROPER_TAG; bit 7: Any DEM Routine (land/water) returned PGSDM_E_CANNOT_ACCESS_DATA; bit 8: Reserved for future layers; bit 9: Reserved for future layers; bit 10: PGS_DEM_GetRegion(elev) returned PGSDM_M_FILLVALUE_INCLUDED; bit 11: PGS_DEM_GetRegion(land/water) returned PGSDM_M_FILLVALUE_INCLUDED; bit 12: Reserved for future layers; bit 13: PGS_DEM_GetRegion(all) returned PGSDM_M_MULTIPLE_RESOLUTIONS; bit 14: PGS_CSC_GetFOV_Pixel() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_GetFOV_Pixel() returned any 'E' class return code
satzen	32-bit floating-point	None	Spacecraft zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
satazi	32-bit floating-point	None	Spacecraft azimuth angle (-180.0 ... 180.0) degrees E of N GEO)
solzen	32-bit floating-point	None	Solar zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
solazi	32-bit floating-point	None	Solar azimuth angle (-180.0 ... 180.0) degrees E of N GEO)
sun_glint_distance	16-bit integer	None	Distance (km) from footprint center to location of the sun glint (-9999 for unknown, 30000 for no glint visible because spacecraft is in Earth's shadow)
topog	32-bit floating-point	None	Mean topography in meters above reference ellipsoid
topog_err	32-bit floating-point	None	Error estimate for topog
landFrac	32-bit floating-point	None	Fraction of spot that is land (0.0 ... 1.0)
landFrac_err	32-bit floating-point	None	Error estimate for landFrac
antenna_temp	32-bit floating-point	Channel (= 15)	Raw antenna temperature in Kelvins (Channel 1: 23.8 GHz; Ch 2: 31.4 GHz; Ch 3: 50.3 GHz; Ch 4: 52.8 GHz; Ch 5: 53.596 +/- 0.115 GHz; Ch 6: 54.4 GHz; Ch 7: 54.94 GHz; Ch 8: 55.5 GHz; Ch 9: f0; Ch 10: f0 +/- 0.217 GHz Ch 11: f0 +/- df +/- 48 MHz; Ch 12: f0 +/- df +/- 22 MHz; Ch 13: f0 +/- df +/- 10 MHz; Ch 14: f0 +/- df +/- 4.5 MHz; Ch 15: 89 GHz (f0 = 57290.344 MHz; df = 322.4 MHz))
brightness_temp	32-bit floating-point	Channel (= 15)	Sidelobe-corrected antenna temperatures in Kelvins (Channel 1: 23.8 GHz; Ch 2: 31.4 GHz; Ch 3: 50.3 GHz; Ch 4: 52.8 GHz; Ch 5: 53.596 +/- 0.115 GHz; Ch 6: 54.4 GHz; Ch 7: 54.94 GHz; Ch 8: 55.5 GHz; Ch 9: f0; Ch 10: f0 +/- 0.217 GHz Ch 11: f0 +/- df +/- 48 MHz; Ch 12: f0 +/- df +/- 22 MHz; Ch 13: f0 +/- df +/- 10 MHz; Ch 14: f0 +/- df +/- 4.5 MHz; Ch 15: 89 GHz (f0 = 57290.344 MHz; df = 322.4 MHz))
brightness_temp_err	32-bit floating-point	Channel (= 15)	Error in brightness_temp (K)

Size: 305100 bytes (0.3 MB) per 45-scanset granule

Total File Size (plus storage for dimensions and other HDF-EOS overhead): 394340 bytes (0.4 MB) per 45-scanset granule = 94.6 MB per day

Special AIRS Types

Limited Engineering Struct: This type is used for engineering data fields for which there are known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num_in = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num_in = 0)

mean	32-bit floating-point	Mean of in-range values field takes on in granule (not valid when num_in = 0)
dev	32-bit floating-point	Standard Deviation of in-range values field takes on in granule (not valid when num_in = 0)
num_in	32-bit integer	Count of in-range values field takes on in granule
num_lo	32-bit integer	Count of out-of-range low values field takes on in granule
num_hi	32-bit integer	Count of out-of-range high values field takes on in granule
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
range_min	32-bit floating-point	Minimum in-range value. Any value less than this is counted in num_lo and is not used in the calculation of mean & dev.
range_max	32-bit floating-point	Maximum in-range value. Any value greater than this is counted in num_hi and is not used in the calculation of mean & dev.
missing	8-bit integer	Missing limits flags. Bit 0 (LSB) is 1 when yellow low (range_min) limit is missing; Bit 1 is high when yellow high (range_max) limit is missing; other bits unused, set to 0.
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

Unlimited Engineering Struct: This type is used for engineering data fields for which there are NOT known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num = 0)
mean	32-bit floating-point	Mean of values field takes on in granule (not valid when num = 0)
dev	32-bit floating-point	Standard Deviation of values field takes on in granule (not valid when num = 0)
num	32-bit integer	Count of occurrences of field in granule (not including those counted in num_bad)
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

A-6. L1B HSB Science Interface Specification

Interface Specification Version 2.7.12.0
2003-03-03

ESDT ShortName = "AIRHBRAD"

Swath Name = "L1B_HSB"

Level = "level1B"

Footprints = 90

scanlines per scanset = 3

Dimensions

These fields define all dimensions that can be used for HDF-EOS swath fields.

The names "GeoTrack" and "GeoXTrack" have a special meaning for this document: "Cross-Track" data fields have a hidden dimension of "GeoXTrack"; "Along-Track" data fields have a hidden dimension of "GeoTrack"; "Full Swath Data Fields have hidden dimensions of both "GeoTrack" and "GeoXTrack".

Name	Value	Explanation
GeoXTrack	90	Dimension across track for footprint positions. Same as number of footprints per scanline. -- starting at the left and increasing towards the right as you look along the satellite's path
GeoTrack	# of scan lines in swath	Dimension along track for footprint positions. Same as number of scanlines in granule. Parallel to the satellite's path, increasing with time. (Nominally 45 for Level-2, AMSU-A, and AIRS/Vis low-rate engineering; 135 for AIRS/Vis and HSB high-rate quantities)
Channel	5	Dimension of radiance array
CalXTrack	8	Dimension "across" track for calibration footprint positions. Same as number of calibration footprints per scanline. (NUM_FOOTPRINTS_HSB_CALIB) (Footprints are ordered: 1-4: spaceviews; 5-8: blackbody radiometric calibration source)
SpaceXTrack	4	Dimension "across" track for spaceview calibration footprint positions in order of observation time. (NUM_FOOTPRINTS_HSB_SPACE)
BBXTrack	4	Dimension "across" track for blackbody calibration footprint positions in order of observation time. (NUM_FOOTPRINTS_HSB_BB)
WarmPRT	7	Number of PRTs measuring warm target

Geolocation Fields

These fields appear for every footprint (GeoTrack * GeoXTrack times) and correspond to footprint center coordinates and "shutter" time.

Name	Explanation
Latitude	Footprint boresight geodetic Latitude in degrees North (-90.0 ... 90.0)
Longitude	Footprint boresight geodetic Longitude in degrees East (-180.0 ... 180.0)
Time	Footprint "shutter" TAI Time: floating-point elapsed seconds since Jan 1, 1993

Size: 291600 bytes (0.3 MB) per 45-scanset granule

Attributes

These fields appear only once per granule

Name	Type	Extra Dimensions	Explanation
processing_level	string of 8-bit characters	None	Zero-terminated character string denoting processing level ("level1B")
instrument	string of 8-bit characters	None	Zero-terminated character string denoting instrument ("HSB")
DayNightFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule as day and/or night: (Always "Day", "Night", or "Both")
AutomaticQAFlag	string of 8-bit characters	None	Zero-terminated character string denoting granule data quality: (Always "Passed", "Failed", or "Suspect")
NumTotalData	32-bit integer	None	Total number of expected channels * scene FOVs
NumProcessData	32-bit integer	None	Number of channels * scene FOVs which are present and can be processed routinely (state = 0)
NumSpecialData	32-bit integer	None	Number of channels * scene FOVs which are present and can be processed only as a special test (state = 1)

NumBadData	32-bit integer	None	Number of channels * scene FOVs which are present but cannot be processed (state = 2)
NumMissingData	32-bit integer	None	Number of expected channels * scene FOVs which are not present (state = 3)
NumLandSurface	32-bit integer	None	Number of scene footprints for which the surface is more than 90% land
NumOceanSurface	32-bit integer	None	Number of scene footprints for which the surface is less than 10% land
node_type	string of 8-bit characters	None	Zero-terminated character string denoting whether granule is ascending, descending, or pole-crossing: ("Ascending" and "Descending" for entirely ascending or entirely descending granules, or "NorthPole" or "SouthPole" for pole-crossing granules)
start_year	32-bit integer	None	Year in which granule started, UTC (e.g. 1999)
start_month	32-bit integer	None	Month in which granule started, UTC (1 ... 12)
start_day	32-bit integer	None	Day of month in which granule started, UTC (1 ... 31)
start_hour	32-bit integer	None	Hour of day in which granule started, UTC (0 ... 23)
start_minute	32-bit integer	None	Minute of hour in which granule started, UTC (0 ... 59)
start_sec	32-bit floating-point	None	Second of minute in which granule started, UTC (0.0 ... 59.0)
start_orbit	32-bit integer	None	Orbit number of mission in which granule started
end_orbit	32-bit integer	None	Orbit number of mission in which granule ended
orbit_path	32-bit integer	None	Orbit path of start orbit (1 ... 233 as defined by EOS project)
start_orbit_row	32-bit integer	None	Orbit row at start of granule (1 ... 248 as defined by EOS project)
end_orbit_row	32-bit integer	None	Orbit row at end of granule (1 ... 248 as defined by EOS project)
granule_number	32-bit integer	None	Number of granule within day (1 ... 240)
num_scansets	32-bit integer	None	Number of scansets in granule (1 ... 45)
num_scanlines	32-bit integer	None	Number of scanlines in granule (3 * num_scansets)
start_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at start of granule in degrees North (-90.0 ... 90.0)
start_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at start of granule in degrees East (-180.0 ... 180.0)
start_Time	64-bit floating-point	None	TAI Time at start of granule (floating-point elapsed seconds since start of 1993)
end_Latitude	64-bit floating-point	None	Geodetic Latitude of spacecraft at end of granule in degrees North (-90.0 ... 90.0)
end_Longitude	64-bit floating-point	None	Geodetic Longitude of spacecraft at end of granule in degrees East (-180.0 ... 180.0)
end_Time	64-bit floating-point	None	TAI Time at end of granule (floating-point elapsed seconds since start of 1993)
eq_x_longitude	32-bit floating-point	None	Longitude of spacecraft at southward equator crossing nearest granule start in degrees East (-180.0 ... 180.0)
eq_x_tai	64-bit floating-point	None	Time of eq_x_longitude in TAI units (floating-point elapsed seconds since start of 1993)
orbitgeoqa	32-bit unsigned integer	None	Orbit Geolocation QA: bit 0 (LSB): bad input value (last scanline); bit 1: bad input value (first scanline); bit 2: PGS_EPH_GetEphMet() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 3: PGS_EPH_GetEphMet() returned PGSEPH_E_BAD_ARRAY_SIZE; bit 4: PGS_EPH_GetEphMet() returned PGSTD_E_TIME_FMT_ERROR; bit 5: PGS_EPH_GetEphMet() returned PGSTD_E_TIME_VALUE_ERROR; bit 6: PGS_EPH_GetEphMet() returned PGSTD_E_SC_TAG_UNKNOWN; bit 7: PGS_EPH_GetEphMet() returned PGS_E_TOOLKIT; bit 8: PGS_TD_UTCtoTAI() returned PGSTD_E_NO_LEAP_SECS; bit 9: PGS_TD_UTCtoTAI() returned PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_TD_UTCtoTAI() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_TD_UTCtoTAI() returned PGS_E_TOOLKIT; bit 12: PGS_CSC_DayNight() returned PGSTD_E_NO_LEAP_SECS; bit 13: PGS_CSC_DayNight() returned PGSCSC_E_INVALID_LIMITTAG; bit 14: PGS_CSC_DayNight() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_DayNight() returned PGSCSC_W_ERROR_IN_DAYNIGHT; bit 16: PGS_CSC_DayNight() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 17: PGS_CSC_DayNight() returned PGSCSC_W_BELOW_HORIZON; bit 18: PGS_CSC_DayNight() returned PGSCSC_W_PREDICTED_UT1; bit 19: PGS_CSC_DayNight() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_DayNight() returned PGSTD_E_BAD_INITIAL_TIME; bit 21: PGS_CSC_DayNight() returned PGSCBP_E_TIME_OUT_OF_RANGE; bit 22: PGS_CSC_DayNight() returned PGSCBP_E_UNABLE_TO_OPEN_FILE; bit 23: PGS_CSC_DayNight() returned PGSMEM_E_NO_MEMORY; bit 24: PGS_CSC_DayNight() returned PGS_E_TOOLKIT; bit 25-31: not used
num_satgeoqa	16-bit integer	None	Number of scans with problems in satgeoqa

num_glintgeoqa	16-bit integer	None	Number of scans with problems in glintgeoqa
num_moongeoqa	16-bit integer	None	Number of scans with problems in moongeoqa
num_ftptgeoqa	16-bit integer	None	Number of footprints with problems in ftptgeoqa
num_zengeoqa	16-bit integer	None	Number of footprints with problems in zengeoqa
num_demgeoqa	16-bit integer	None	Number of footprints with problems in demgeoqa
num_fpe	16-bit integer	None	Number of floating point errors
LonGranuleCen	16-bit integer	None	Geodetic Longitude of the center of the granule in degrees East (-180 ... 180)
LatGranuleCen	16-bit integer	None	Geodetic Latitude of the center of the granule in degrees North (-90 ... 90)
LocTimeGranuleCen	16-bit integer	None	Local solar time at the center of the granule in minutes past midnight (0 ... 1439)
center_freq	32-bit floating-point	Channel (= 5)	Channel Center frequency (GHz)
IF_offset_1	32-bit floating-point	Channel (= 5)	Offset of first intermediate frequency stage (MHz) (zero for no mixing)
IF_offset_2	32-bit floating-point	Channel (= 5)	Offset of second intermediate frequency stage (MHz) (zero for no second mixing)
bandwidth	32-bit floating-point	Channel (= 5)	Bandwidth of sum of 1, 2, or 4 channels (MHz)
num_scanlines_not_norm_mode	32-bit integer	None	Number of scanlines not in Process state
num_calibrated_scanlines	32-bit integer	Channel (= 5)	Number of scanlines that had calibration coefs applied
num_missing_scanlines	32-bit integer	None	Number of scanlines with state = missing
num_data_gaps	32-bit integer	None	Number of blocks of scanlines where State is not Process
num_instr_mode_changes	32-bit integer	None	Number of operational instrument mode changes
num_scanlines_rec_cal_prob	32-bit integer	None	Number of scanlines with non-zero qa_receiver
num_scanlines_ch_cal_problems	32-bit integer	Channel (= 5)	Number of scanlines with non-zero qa_channel
num_scanlines_sig_coast_xing	32-bit integer	None	Number of scanlines with qa_scanline coast crossing bit set
num_scanlines_sig_sun_glint	32-bit integer	None	Number of scanlines with qa_scanline sun glint bit set
MoonInViewMWCount	32-bit integer	None	Number of scanlines in granule with the moon in the HSB space view
QA_unfiltered_scene_count	Unlimited Engineering Struct (see below)	GeoXTrack (= 90) * Channel (= 5)	Per footprint position raw scene count summary QA
QA_unfiltered_BB_count	Unlimited Engineering Struct (see below)	BBXTrack (= 4) * Channel (= 5)	Per BB footprint position raw warm count summary QA (unfiltered)
QA_unfiltered_space_count	Unlimited Engineering Struct (see below)	SpaceXTrack (= 4) * Channel (= 5)	Per space footprint position raw cold count summary QA (unfiltered)
QA_bb_PRT	Limited Engineering Struct (see below)	None	Blackbody PRT temperature summary QA (C)
QA_rec_PRT	Limited Engineering Struct (see below)	None	Receiver PRT temperature summary QA (C)
QA_cal_coef_a0	Unlimited Engineering Struct (see below)	Channel (= 5)	Calibration coefficient a0 summary QA (K)
QA_cal_coef_a1	Unlimited Engineering Struct (see below)	Channel (= 5)	Calibration coefficient a1 summary QA (K/count)
QA_cal_coef_a2	Unlimited Engineering Struct (see below)	Channel (= 5)	Calibration coefficient a2 summary QA (K/count**2)
QA_bb_raw_noise_counts	Unlimited Engineering Struct (see below)	Channel (= 5)	Summary QA on differences between warm cal counts

	below)		
QA_sv_raw_noise_counts	Unlimited Engineering Struct (see below)	Channel (= 5)	Summary QA on differences between cold cal counts
QA_NeDT	Unlimited Engineering Struct (see below)	Channel (= 5)	Summary QA on gain * differences between warm cal counts (K)
QA_NeDT2NomRatio	Unlimited Engineering Struct (see below)	Channel (= 5)	Summary QA on gain * differences between warm cal counts over nominal NeDT (unitless)
granules_present	string of 8-bit characters	None	Zero-terminated character string denoting which adjacent granules were available for smoothing ("All" for both previous & next, "Prev" for previous but not next, "Next" for next but not previous, "None" for neither previous nor next)

Size: 29886 bytes (0.0 MB) per granule

Along-Track Data Fields

These fields appear once per scanline (GeoTrack times)

Name	Type	Extra Dimensions	Explanation
satheight	32-bit floating-point	None	Satellite altitude at nadirTAI in km above reference ellipsoid (e.g. 725.2)
satroll	32-bit floating-point	None	Satellite attitude roll angle at nadirTAI (-180.0 ... 180.0 angle about the +x (roll) ORB axis, +x axis is positively oriented in the direction of orbital flight completing an orthogonal triad with y and z.)
satpitch	32-bit floating-point	None	Satellite attitude pitch angle at nadirTAI (-180.0 ... 180.0 angle about +y (pitch) ORB axis. +y axis is oriented normal to the orbit plane with the positive sense opposite to that of the orbit's angular momentum vector H.)
satyaw	32-bit floating-point	None	Satellite attitude yaw angle at nadirTAI (-180.0 ... 180.0 angle about +z (yaw) axis. +z axis is positively oriented earthward parallel to the satellite radius vector R from the spacecraft center of mass to the center of the Earth.)
satgeoqa	32-bit unsigned integer	None	Satellite Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAtoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAtoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_EPH_EphemAttit() returned PGSEPH_W_BAD_EPHEM_VALUE; bit 4: PGS_EPH_EphemAttit() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 5: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 6: PGS_EPH_EphemAttit() returned PGSEPH_E_NO_DATA_REQUESTED; bit 7: PGS_EPH_EphemAttit() returned PGSTD_E_SC_TAG_UNKNOWN; bit 8: PGS_EPH_EphemAttit() returned PGSEPH_E_BAD_ARRAY_SIZE; bit 9: PGS_EPH_EphemAttit() returned PGSTD_E_TIME_FMT_ERROR; bit 10: PGS_EPH_EphemAttit() returned PGSTD_E_TIME_VALUE_ERROR; bit 11: PGS_EPH_EphemAttit() returned PGSTD_E_NO_LEAP_SECS; bit 12: PGS_EPH_EphemAttit() returned PGS_E_TOOLKIT; bit 13: PGS_CSC_ECtoECR() returned PGSCSC_W_BAD_TRANSFORM_VALUE; bit 14: PGS_CSC_ECtoECR() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 15: PGS_CSC_ECtoECR() returned PGSTD_E_NO_LEAP_SECS; bit 16: PGS_CSC_ECtoECR() returned PGSTD_E_TIME_FMT_ERROR; bit 17: PGS_CSC_ECtoECR() returned PGSTD_E_TIME_VALUE_ERROR; bit 18: unused (set to zero); bit 19: PGS_CSC_ECtoECR() returned PGSTD_E_NO_UT1_VALUE; bit 20: PGS_CSC_ECtoECR() returned PGS_E_TOOLKIT; bit 21: PGS_CSC_ECRtoGEO() returned PGSCSC_W_TOO_MANY_ITERS; bit 22: PGS_CSC_ECRtoGEO() returned PGSCSC_W_INVALID_ALTITUDE; bit 23: PGS_CSC_ECRtoGEO() returned PGSCSC_W_SPHERE_BODY; bit 24: PGS_CSC_ECRtoGEO() returned PGSCSC_W_LARGE_FLATTENING; bit 25: PGS_CSC_ECRtoGEO() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 26: PGS_CSC_ECRtoGEO() returned PGSCSC_E_BAD_EARTH_MODEL; bit 27: PGS_CSC_ECRtoGEO() returned PGS_E_TOOLKIT; bit 28-31: not used
glintgeoqa	16-bit unsigned integer	None	Glint Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: glint location in Earth's shadow; bit 2: glint calculation not converging; bit 3: glint location sun vs. satellite zenith mismatch; bit 4: glint location sun vs. satellite azimuth mismatch; bit 5: bad glint location; bit 6: PGS_CSC_ZenithAzimuth() returned any 'W' class return code; bit 7: PGS_CSC_ZenithAzimuth() returned any 'E' class return code; bit 8: PGS_CBP_Earth_CB_Vector() returned returned any 'W' class return code; bit 9: PGS_CBP_Earth_CB_Vector() returned returned any 'E' class return code; bit 10: PGS_CSC_ECtoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1 (for Glint); bit 11: PGS_CSC_ECtoECR() returned any 'E' class return code (for Glint); bit 12: PGS_CSC_ECRtoGEO() returned any 'W' class return code (for Glint); bit 13: PGS_CSC_ECRtoGEO() returned any 'E' class return code (for Glint); bit 14: PGS_CSC_ECtoECR() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_ECtoECR() returned any 'E' class return code
moongeoqa	16-bit unsigned integer	None	Moon Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAtoUTC() returned PGSTD_E_NO_LEAP_SECS; bit 2: PGS_TD_TAtoUTC() returned PGS_E_TOOLKIT; bit 3: PGS_CBP_Sat_CB_Vector() returned PGSCSC_W_BELOW_SURFACE; bit 4: PGS_CBP_Sat_CB_Vector() returned

			PGSCBP_W_BAD_CB_VECTOR; bit 5: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_BAD_ARRAY_SIZE; bit 6: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_INVALID_CB_ID; bit 7: PGS_CBP_Sat_CB_Vector() returned PGSMEM_E_NO_MEMORY; bit 8: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_UNABLE_TO_OPEN_FILE; bit 9: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_BAD_INITIAL_TIME; bit 10: PGS_CBP_Sat_CB_Vector() returned PGSCBP_E_TIME_OUT_OF_RANGE; bit 11: PGS_CBP_Sat_CB_Vector() returned PGSTD_E_SC_TAG_UNKNOWN; bit 12: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 13: PGS_CBP_Sat_CB_Vector() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 14: PGS_CBP_Sat_CB_Vector() returned PGS_E_TOOLKIT; bit 15: not used
nadirTAI	64-bit floating-point	None	TAI time at which instrument is nominally looking directly down. (between footprints 15 & 16 for AMSU or between footprints 45 & 46 for AIRS/Vis & HSB) (floating-point elapsed seconds since start of 1993)
sat_lat	64-bit floating-point	None	Satellite geodetic latitude in degrees North (-90.0 ... 90.0)
sat_lon	64-bit floating-point	None	Satellite geodetic longitude in degrees East (-180.0 ... 180.0)
scan_node_type	8-bit integer	None	'A' for ascending, 'D' for descending, 'N' for North-Polar, 'S' for South-Polar
glintlat	32-bit floating-point	None	Solar glint geodetic latitude in degrees North at nadirTAI (-90.0 ... 90.0)
glintlon	32-bit floating-point	None	Solar glint geodetic longitude in degrees East at nadirTAI (-180.0 ... 180.0)
state	32-bit integer	None	Data state: 0:Process, 1:Special, 2:Erroneous, 3:Missing
cal_coef_a0	32-bit floating-point	Channel (= 5)	Calibration coefficients to convert raw counts to antenna temperature (K)
cal_coef_a1	32-bit floating-point	Channel (= 5)	Calibration coefficients to convert raw counts to antenna temperature (K/count)
cal_coef_a2	32-bit floating-point	Channel (= 5)	Calibration coefficients to convert raw counts to antenna temperature (K/count**2)
cal_coef_a0_err	32-bit floating-point	Channel (= 5)	Error estimate for cal_coef_a0 (K)
cal_coef_a1_err	32-bit floating-point	Channel (= 5)	Error estimate for cal_coef_a1 (K/count)
cal_coef_a2_err	32-bit floating-point	Channel (= 5)	Error estimate for cal_coef_a2 (K/count**2)
SpacViewSelct	8-bit integer	None	Space View Selected
mixer_17_temp_used	8-bit integer	None	Mixer 17 Temperature use flag. (1: used mixer 17 temperature for receiver temperature; 0: used mixer 18/19/20 temperature)
receiver_temp	32-bit floating-point	None	Receiver temperature used in calibration (mixer 17 temperature or mixer 18/19/20 temperature as specified by mixer_17_temp_used) (C)
target_temp	32-bit floating-point	None	HSB target temperature used in calibration (C)
qa_scanline	8-bit unsigned integer	None	Scanline bitmap for HSB: Bit 0: Sun glint in this scanline; Bit 1: Coastal crossing in this scanline; Bit 2: Some channels had excessive NeDT estimate; Bit 3: Near sidelobe correction applied
qa_receiver	8-bit unsigned integer	None	Receiver bitmap for HSB: Bit 0: Calibration was not derived, due to the instrument mode; Bit 1: Calibration was not derived, due to bad or missing PRT values; Bit 2: This scanline was calibrated, but the moon was in the space view; Bit 3: This scanline was calibrated, but there was a space view scan position err; Bit 4: This scanline was calibrated, but there was a blackbody scan position error; Bit 5: This scanline was calibrated, but some PRT values were bad or marginal; Bit 6: This scanline was calibrated, but there was a data gap; Bit 7: Some channels were not calibrated
qa_channel	8-bit unsigned integer	Channel (= 5)	Channel bitmap for HSB: Bit 0: All space view counts were bad for this channel and scanline; Bit 1: Space view counts were marginal for this channel and scanline; Bit 2: Space view counts could not be smoothed; Bit 3: All blackbody counts were bad for this channel and scanline; Bit 4: Blackbody counts were marginal for this channel and scanline; Bit 5: Blackbody counts could not be smoothed; Bit 6: Most recent calibration coefficients used; Bit 7: Excessive NeDT estimated

Size: 26730 bytes (0.0 MB) per 45-scanset granule

Full Swath Data Fields

These fields appear for every footprint of every scanline in the granule (GeoTrack * GeoXTrack times)

Name	Type	Extra Dimensions	Explanation
scanang	32-bit floating-point	None	Scanning angle of HSB instrument with respect to the HSB instrument for this footprint (-180.0 ... 180.0, negative at start of scan, 0 at nadir)
ftptgeoqa	32-bit unsigned	None	Footprint Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: PGS_TD_TAItoUTC() returned PGSTD_E_NO_I_FAP_SECS; bit 2: PGS_TD_TAItoUTC() returned PGS_E_TOOLKIT

	integer		bit 3: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_MISS_EARTH; bit 4: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_SC_TAG_UNKNOWN; bit 5: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_ZERO_PIXEL_VECTOR; bit 6: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_EPH_FOR_PIXEL; bit 7: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_INSTRUMENT_OFF_BOARD; bit 8: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_BAD_ACCURACY_FLAG; bit 9: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_BAD_ARRAY_SIZE; bit 10: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DEFAULT_EARTH_MODEL; bit 11: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_DATA_FILE_MISSING; bit 12: PGS_CSC_GetFOV_Pixel() returned PGSCSC_E_NEG_OR_ZERO_RAD; bit 13: PGS_CSC_GetFOV_Pixel() returned PGSMEM_E_NO_MEMORY; bit 14: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_LEAP_SECS; bit 15: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_FMT_ERROR; bit 16: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_TIME_VALUE_ERROR; bit 17: PGS_CSC_GetFOV_Pixel() returned PGSCSC_W_PREDICTED_UT1; bit 18: PGS_CSC_GetFOV_Pixel() returned PGSTD_E_NO_UT1_VALUE; bit 19: PGS_CSC_GetFOV_Pixel() returned PGS_E_TOOLKIT; bit 20: PGS_CSC_GetFOV_Pixel() returned PGSEPH_E_BAD_EPHEM_FILE_HDR; bit 21: PGS_CSC_GetFOV_Pixel() returned PGSEPH_E_NO_SC_EPHEM_FILE; bit 22-31: not used
zengeoqa	16-bit unsigned integer	None	Satellite zenith Geolocation QA flags: bit 0 (LSB): (Spacecraft) bad input value; bit 1: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_BELOW_HORIZON; bit 2: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 3: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_W_NO_REFRACTION; bit 4: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_INVALID_VECTAG; bit 5: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_LOOK_PT_ALTIT_RANGE; bit 6: PGS_CSC_ZenithAzimuth(S/C) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 7: PGS_CSC_ZenithAzimuth(S/C) returned PGS_E_TOOLKIT; bit 8: (Sun) bad input value; bit 9: (suppressed) PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_BELOW_HORIZON (This is not an error condition - the sun is below the horizon at night); bit 10: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_UNDEFINED_AZIMUTH; bit 11: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_W_NO_REFRACTION; bit 12: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_INVALID_VECTAG; bit 13: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_LOOK_PT_ALTIT_RANGE; bit 14: PGS_CSC_ZenithAzimuth(Sun) returned PGSCSC_E_ZERO_INPUT_VECTOR; bit 15: PGS_CSC_ZenithAzimuth(Sun) returned PGS_E_TOOLKIT
demgeoqa	16-bit unsigned integer	None	Digital Elevation Model (DEM) Geolocation QA flags: bit 0 (LSB): bad input value; bit 1: Could not allocate memory; bit 2: Too close to North or South pole. Excluded; bit 3: Layer resolution incompatibility. Excluded; bit 4: Any DEM Routine (elev) returned PGSDM_E_IMPROPER_TAG; bit 5: Any DEM Routine (elev) returned PGSDM_E_CANNOT_ACCESS_DATA; bit 6: Any DEM Routine (land/water) returned PGSDM_E_IMPROPER_TAG; bit 7: Any DEM Routine (land/water) returned PGSDM_E_CANNOT_ACCESS_DATA; bit 8: Reserved for future layers; bit 9: Reserved for future layers; bit 10: PGS_DEM_GetRegion(elev) returned PGSDM_M_FILLVALUE_INCLUDED; bit 11: PGS_DEM_GetRegion(land/water) returned PGSDM_M_FILLVALUE_INCLUDED; bit 12: Reserved for future layers; bit 13: PGS_DEM_GetRegion(all) returned PGSDM_M_MULTIPLE_RESOLUTIONS; bit 14: PGS_CSC_GetFOV_Pixel() returned any 'W' class return code except PGSCSC_W_PREDICTED_UT1; bit 15: PGS_CSC_GetFOV_Pixel() returned any 'E' class return code
satzen	32-bit floating-point	None	Spacecraft zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
satazi	32-bit floating-point	None	Spacecraft azimuth angle (-180.0 ... 180.0) degrees E of N GEO)
solzen	32-bit floating-point	None	Solar zenith angle (0.0 ... 180.0) degrees from zenith (measured relative to the geodetic vertical on the reference (WGS84) spheroid and including corrections outlined in EOS SDP toolkit for normal accuracy.)
solazi	32-bit floating-point	None	Solar azimuth angle (-180.0 ... 180.0) degrees E of N GEO)
sun_glint_distance	16-bit integer	None	Distance (km) from footprint center to location of the sun glint (-9999 for unknown, 30000 for no glint visible because spacecraft is in Earth's shadow)
topog	32-bit floating-point	None	Mean topography in meters above reference ellipsoid
topog_err	32-bit floating-point	None	Error estimate for topog
landFrac	32-bit floating-point	None	Fraction of spot that is land (0.0 ... 1.0)
landFrac_err	32-bit floating-point	None	Error estimate for landFrac
antenna_temp	32-bit floating-point	Channel (= 5)	Raw antenna temperature in Kelvins (Channel 1: Deleted 89.0 GHz channel; always invalid; Ch 2: 150.0 GHz; Ch 3: f0 +/- 1.0 GHz; Ch 4: f0 +/- 3.0 GHz; Ch 5: f0 +/- 7.0 GHz (f0 = 183.31 GHz))
brightness_temp	32-bit floating-point	Channel (= 5)	Sidelobe-corrected antenna temperatures in Kelvins (Channel 1: Deleted 89.0 GHz channel; always invalid; Ch 2: 150.0 GHz; Ch 3: f0 +/- 1.0 GHz; Ch 4: f0 +/- 3.0 GHz; Ch 5: f0 +/- 7.0 GHz (f0 = 183.31 GHz))
brightness_temp_err	32-bit floating-point	Channel (= 5)	Error in brightness_temp (K)

Size: 1287900 bytes (1.3 MB) per 45-scanset granule

**Total File Size (plus storage for dimensions and other HDF-EOS overhead):
1636116 bytes (1.6 MB) per 45-scanset granule = 392.7 MB per day**

Special AIRS Types

Limited Engineering Struct: This type is used for engineering data fields for which there are known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num_in = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num_in = 0)
mean	32-bit floating-point	Mean of in-range values field takes on in granule (not valid when num_in = 0)
dev	32-bit floating-point	Standard Deviation of in-range values field takes on in granule (not valid when num_in = 0)
num_in	32-bit integer	Count of in-range values field takes on in granule
num_lo	32-bit integer	Count of out-of-range low values field takes on in granule
num_hi	32-bit integer	Count of out-of-range high values field takes on in granule
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
range_min	32-bit floating-point	Minimum in-range value. Any value less than this is counted in num_lo and is not used in the calculation of mean & dev.
range_max	32-bit floating-point	Maximum in-range value. Any value greater than this is counted in num_hi and is not used in the calculation of mean & dev.
missing	8-bit integer	Missing limits flags. Bit 0 (LSB) is 1 when yellow low (range_min) limit is missing; Bit 1 is high when yellow high (range_max) limit is missing; other bits unused, set to 0.
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

Unlimited Engineering Struct: This type is used for engineering data fields for which there are NOT known "yellow" limits

Field Name	Type	Explanation
min	32-bit floating-point	Minimum value field takes on in granule (not valid when num = 0)
max	32-bit floating-point	Maximum value field takes on in granule (not valid when num = 0)
mean	32-bit floating-point	Mean of values field takes on in granule (not valid when num = 0)
dev	32-bit floating-point	Standard Deviation of values field takes on in granule (not valid when num = 0)
num	32-bit integer	Count of occurrences of field in granule (not including those counted in num_bad)
num_bad	32-bit integer	Count of occasions on which field takes on invalid flag value (-9999) in granule
max_track	32-bit integer	GeoTrack index (counting from 1) where max was found
max_xtrack	32-bit integer	GeoXTrack index (counting from 1) where max was found
min_track	32-bit integer	GeoTrack index (counting from 1) where min was found
min_xtrack	32-bit integer	GeoXTrack index (counting from 1) where min was found

This page intentionally left blank.

Appendix B. AIRS Level-1B Filename and Local Granule ID (LGID) Convention

AIRS filenames correspond to the "identifier" portion of the ECS Local Granule ID (LGID) standard:

LGID:shortname:version:identifier

where:

":" is a colon that acts as a separator of the parts of the LGID

"LGID" is a literal string

"shortname" is the ECS ESDT shortname

"version" is the ECS ESDT version

"identifier" is

AIRS.yyyy.mm.dd.ggg.Lev.Instr_Prod.vm.m.r.b.lvid.Fttttttttt.ext

as detailed below

We'll use identifiers of:

AIRS.yyyy.mm.dd.ggg.Lev.Instr_Prod.vm.m.r.b.lvid.Fttttttttt.ext

Making the whole LGID:

LGID:shortname:version:AIRS.yyyy.mm.dd.ggg.Lev.Instr_Prod.vm.m.r.b.lvid.Fttttttttt.ext

where:

AIRS is the literal string "AIRS" to identify this as an AIRS-instrument-suite product.

yyyy.mm.dd is the year/month/day of the start of the granule.

Note: yyyy.mm.dd is the date of which T00Z is the start for T00Z.L*.Match_RaObs, T00Z.Loc_RaObs, and T00Z.GStat_RaObs files.

Note: yyyy.mm.dd is start of last day specified for VegMapxxX

ggg is the granule number in day (001 - 240).

Lev is processing level:

"L1A", "L1B", "L2", or "L3".

Instr is instrument name:

"AMSU" for AMSU-A

"HSB" for HSB

"VIS" for Vis channels of AIRS when there is a separate Vis product

"AIRS" for AIRS/IR *or* AIRS/IR + AIRS/Vis

Prod is descriptor of product:

For L1B:

"Rad" for science radiances (including MW instruments where radiances are in units of brightness temperature)

"QaSub" for QA subsets

vm.m.r.b is the PGEVersion uniquely identifying a configuration of source code + static ancillary files. "v" is the literal character 'v'. It is followed by four numbers separated by three "."s. These are the major & minor version numbers, a release number, and a build number. Example: "v2.5.12.45" is the 45th build of release 12 of version 2.5.

lvid is the LocalVersionID. This field is optional and usually absent.

Note: LocalVersionID is not included when the processing facility is "A" or "G"

F is processing facility ID:

"G" for GSFC DAAC

"A" for AIRS TLSCF official TDS processing

"T" for AIRS TLSCF official testing

"S" for AIRS TLSCF officially sanctioned simulation

"D" for any direct broadcast station

"N" for NOAA NESDIS

"X" for anything else

ttttttttt is AIRS run tag (000000000000 - 99999999999).

This field is designed to ensure LocalGranuleIDs are unique, even when the same software is used to reprocess the same data. It is local processing time as yyyydoyhhmmss. (year, doy-of-year (julian day), hour, minute, second).

Note: this corresponds to PSA AIRSRunTag.

ext is the filetype extension:

".hdf" for all HDF products (including HDF-EOS)

".txt" for all text products

".bin" for raw binary files (not standard products)

Note: when optional fields are absent only one "." appears, never two in a row. Trailing "."s are also omitted.

Here's a full set (one of each type) of Level-1B granules:

AIRS.2001.12.03.131.L1B.AMSU_Rad.v2.12.5.4.A2002123120634.hdf
AIRS.2001.12.03.131.L1B.HSB_Rad.v2.12.5.4.A2002123120634.hdf
AIRS.2001.12.03.131.L1B.AIRS_Rad.v2.12.5.4.A2002123120634.hdf
AIRS.2001.12.03.131.L1B.AIRS_QaSub.v2.12.5.4.A2002123120634.hdf
AIRS.2001.12.03.131.L1B.VIS_Rad.v2.12.5.4.A2002123120634.hdf
AIRS.2001.12.03.131.L1B.VIS_QaSub.v2.12.5.4.A2002123120634.hdf

Appendix C-1. AIRS Products

ESDT Short Name	Sample File Name (Local Granule ID)	PCF LID	Instr.	Usage	File Size Per Granule (MB)	Files Per Day	Daily Rate (MB per Day)	Description
AIRHASCII	AIRS.2000.12.15.001.L1A.HSB.v2.2.3.33.X02108051026	7122	HSB	L1A Product Output, L1B Product Input	1.0	240	247.2	HSB L1A Science Footprints-HDF: HSB geolocated counts for scene footprints
AIRAASCII	AIRS.2000.12.15.001.L1A.AMSU.v2.2.3.33.X02108050537	7120	AMSU-A	L1A Product Output, L1B Product Input	0.2	240	50.4	AMSU-A L1A Science Footprints-HDF: AMSU-A1 & AMSU-A2 combined, geolocated counts for scene footprints
AIRIASCI	AIRS.2000.12.15.001.L1A.AIRS_Scene.v2.2.3.33.X02108052348	7121	AIRS	L1A Product Output, L1B Product Input	58.7	240	14089.7	AIRS L1A Science Footprints-HDF: AIRS infrared geolocated counts for scene footprints
AIRVASCI	AIRS.2000.12.15.001.L1A.VIS_Scene.v2.2.3.33.X02108052348	7123	AIRS	L1A Product Output, L1B Product Input	9.5	240	2273.9	VIS L1A Science Footprints-HDF: AIRS visible geolocated counts for scene footprints

AIRIACAL	AIRS.2000.12.15.001.L1A.AIRS_Calib.v2.2.3.33.X02108052348	7111	AIRS	L1A Product Output, L1B Product Input	3.9	240	934.2	AIRS L1A Calibration Footprints-HDF: AIRS IR counts for space, blackbody, spectral cal. & photometric cal. sources including engineering data for calibration
AIRVACAL	AIRS.2000.12.15.001.L1A.VIS_Calib.v2.2.3.33.X02108052348	7113	AIRS	L1A Product Output, L1B Product Input	0.5	240	120.5	VIS L1A Calibration Footprints-HDF: AIRS visible counts for space, blackbody, spectral cal. & photometric cal. sources including engineering data for calibration
AIRBAQAP	AIRS.2000.12.15.001.L1A.AIRS_QaSub.v2.2.3.33.X02108052348	7140	AIRS	L1A AIRS/VIS QA Output	0.5	240	114.1	L1A AIRS/VIS QA Product
AIRIAHRE	AIRS.2000.12.15.001.L1A.AIRS_HREng.v2.2.3.33.X02108052348	7130	AIRS	AIRS/VIS High-Rate Engineering Archival Product	1.0	240	239.1	AIRS/VIS High-Rate Engineering Archival Product
AIRIAHRS	AIRS.2000.12.15.001.L1A.AIRS_EngStat.v2.2.3.33.X02108052348	7131	AIRS	AIRS/VIS Engineering Statistics Product	0.2	240	44.0	AIRS/VIS Engineering Statistics Product

AIRHBRAD	AIRS.2000.12.15.001.L1B.HSB_Rad.v2.2.3.33.X02108051208	6302, 6312 & 7212	HSB	L1B Product Output, L2 Product Input, RaObs PGE Input, HSB Daily Browse PGE Input	1.4	240	334.3	HSB L1B Radiances-HDF: HSB geolocated & calibrated brightness temp. in Kelvin
AIRHBQAP	AIRS.2000.12.15.001.L1B.HSB_QaSup.v2.2.3.33.X02108051208	7252	HSB	L1B Optional Product Output	1.9	240	450.8	HSB QA Support Product for debugging
AIRABRAD	AIRS.2000.12.15.001.L1B.AMSU_Rad.v2.2.3.33.X02108050637	6300, 6310 & 7210	AMSU-A	L1B Product Output, L2 Product Input, RaObs PGE Input, AMSU Daily Browse PGE Input	0.3	240	75.2	AMSU-A L1B Radiances-HDF: AMSU-A1 & AMSU-A2 combined, geolocated & calibrated brightness temp. in Kelvin
AIRABQAP	AIRS.2000.12.15.001.L1B.AMSU_QaSup.v2.2.3.33.X02108050637	7250	AMSU-A	L1B Optional Product Output	0.7	240	163.9	AMSU QA Support Product for debugging

AIRIBRAD	AIRS.2000.12.15.001.L1B.AIRS_Rad.v2.2.3.33.X02108054232	6211 & 7211	AIRS	L1B Product Output, L2 Product Input, RaObs PGE Input	121.1	240	29073.7	AIRS L1B Radiances-HDF: AIRS IR Geolocated Radiances in Watts/cm**2/micron/steradian
AIRIBCBS	AIRS.2000.12.15.001.L1B.AIRS_BrSub.v2.2.3.33.X02108054232	7241	AIRS	AIRS L1B Browse Subset, AIRS Daily Browse PGE Input	0.6	240	151.7	AIRS L1B Browse Subset
AIRIBQAP	AIRS.2000.12.15.001.L1B.AIRS_QaSub.v2.2.3.33.X02108054232	7251	AIRS	AIRS L1B QA Product Output	5.5	240	1323.8	AIRS L1B QA Product Output
AIRVBRAD	AIRS.2000.12.15.001.L1B.VIS_Rad.v2.2.3.33.X02108053937	7213	AIRS	L1B Product Output, L2 Product Input, RaObs PGE Input, VIS One-Day Surface PGE Input	16.6	240	3987.9	VIS L1B Radiances-HDF: VIS Geolocated Radiances in Watts/cm**2/micron/steradian
AIRVBQAP	AIRS.2000.12.15.001.L1B.VIS_QaSub.v2.2.3.33.X02108053937	7253	AIRS	VIS L1B QA Product Output	0.9	240	225.1	VIS L1B QA Product Output

AIRX2RET	AIRS.2000.12.15.001.L2.RetStd.v2.2.3.33.X02108055444	7300	AIRS	L2 Product Output, RaObs PGE Input	4.6	240	1114.3	AIRS L2 Standard Retrieval Product
AIRI2CCF	AIRS.2000.12.15.001.L2.CC.v2.2.3.33.X02108055444	7301	AIRS	L2 Product Output, RaObs PGE Input	25.8	240	6190.7	AIRS L2 Cloud-Cleared Radiance Product
AIRX2SUP	AIRS.2000.12.15.001.L2.RetSup.v2.2.3.33.X02108055444	7302	AIRS	L2 Product Output, RaObs PGE Input	17.6	240	4228.5	AIRS L2 Support Product
AIRX2RBS	AIRS.2000.12.15.001.L2.RetBrSub.v2.2.3.33.X02108055444	7310	AIRS	L2 Product Output, L2 Ret Product Daily Browse PGE Input	0.1	240	22.0	AIRS L2 Retrieval Browse Subset Product
AIRI2CBS	AIRS.2000.12.15.001.L2.CCBrSub.v2.2.3.33.X02108055444	7311	AIRS	L2 Product Output, L2 CC Radiance Daily Browse PGE Input	0.1	240	16.9	AIRS L2 Cloud-Cleared Radiance Browse Subset Product
AIRX2QAP	AIRS.2000.12.15.001.L2.RetQa.v2.2.0.89.X02108055444	7303	AIRS	L2 Product Output	2.8	240	683.0	AIRS L2 QA Support Product
AIRXGSTA	L2-RetGStat	8301	AIRS	L2 Product Output	0.25	240	6.0	Granule Statistics versus Truth

AIRX2LOC	AIRS.2000.12.15.T18Z.Loc_RaOb.a.v2.2.0.57.X02108055444	7402	RaObs	RaObs Tempora ry File	Various	4	0.5	Truth Location File
AIRX2MAT	AIRS.2000.12.15.T18Z.L2.Match_RaOb.a.v2.2.0.57.X02108055444	7401		RaObs PGE Output	1000	4	4000	Matchups of radiances, retrievals, and radiosondes - runs 4 times per day in overlapping runs
AIRHBDBR	AIRS.2000.12.15.A.L1B.Browse_HSB.v2.2.3.33.X02108051352	7263	HSB	HSB Daily Browse PGE Output	0.3	2	0.6	HSB Daily Browse Package - Ascending & Descending
AIRABDBR	AIRS.2000.12.15.A.L1B.Browse_AMSU.v2.2.3.33.X02108050955	7261	AMSU-A	AMSU-A Daily Browse PGE Output	0.6	2	1.2	AMSU-A Daily Browse Package - Ascending & Descending
AIRIBDBR	AIRS.2000.12.15.A.L1B.Browse_AIRS.v2.2.3.33.X02108054749	7262	AIRS	AIRS Daily Browse PGE Output	0.4	2	0.8	AIRS Daily Browse Package - Ascending & Descending
AIRX2DBR	AIRS.2000.12.15.A.L2.Browse_Ret.v2.2.3.33.X02108061810	7320	AIRS	L2 Retrieve d Product Daily Browse PGE Output	0.5	2	1.0	L2 Retrieval Daily Browse Package - Ascending & Descending

AIRX2ASD	AIRS.2000.12.15.A.L2.DailyRetSum.v2.2.3.33.X02108061810	7322	AIRS	L2 Retrieve d Product Daily Browse PGE Output	11.5	2	23.0	L2 Browse Summary Data - Ascending & Descending
AIRI2DBR	AIRS.2000.12.15.A.L2.Browse_CC.v2.2.3.33.X02108061724	7321	AIRS	L2 Cloud-Cleared Radiance Daily Browse PGE Output	0.4	2	0.8	L2 Cloud-Cleared Radiance Daily Browse Package - Ascending & Descending
AIRVBVID	Daily Vegetation Map	7500	AIRS	Vis One-Day Surface PGE Output	700	1	700	Daily Vegetation Map; Processing proceeds when all input granules are available, or at least one input granule is available and 48 hours have passed since the time of latest observation. AIRVBVID is an archive-only product, archived but available to external users. See AIRS Production Rules.
AIRVBVIM	Multi-day Vegetation Map	7501	AIRS	Vis Multi-Day Surface PGE Output	700	1	700	Multi-Day Vegetation Map; Processing proceeds when all input AIRSVBVIDs are available, or at least one input AIRSVBVID is available and 52 hours have passed since the time of latest observation. AIRVBIM is an archive-only product, archived but available to external users. See AIRS Production Rules.

This page intentionally left blank.

Appendix C-2. AIRS Dynamic Inputs

ESDT Short Name	Sample File Name (Local Granule ID)	PCF LID	Instr.	Usage	Daily Rate (MB per Day)	Description
PM1EPHND	PM1EPHND#001040920021200000000001	10501		L1A Dynamic Ancillary Input	6.0	Definitive Spacecraft Ephemeris
PM1ATTNR	PM1ATTNR#001040920021200000000001	10502		L1A Dynamic Ancillary Input	6.0	Restituted Spacecraft Attitude
PMCO_HK	DAAC_INST_CARRYOUT-pm_1-epds-2002118005744-2002118010019-01.dmf	4007 & 4008		L1A Dynamic Ancillary Input	12.0	Aqua housekeeping carryout file, including spacecraft & passive analog data
AIRH0ScE	P1540342AAAAAAAAAAAAAAAA01264200000000.PDS	342/9342	HSB	L1A Product Input	2.2	APID 342/9342: All Science Data Packets collected by the HSB instrument during one scan period
AIR10XNM	P1540257AAAAAAAAAAAAAAAA01264200000000.PDS	257/9257	AMSU - A	Special Case: L1A Product Input	[1.8]	Special Case: APID 257/9257 AMSU-A1 Science Data Packets - No Mode; substituted for APIDs 261 & 262 when instrument is in "No Mode"
AIRAACAL	P1540259AAAAAAAAAAAAAAAA01264200000000.PDS	259/9259	AMSU - A	Special Case: L1A Product Input	[7.7]	Special Case: APID 259/9259 AMSU-A1 Science Data Packets - Staring Mode Packet 1; substituted for APID 261 when instrument is in "Staring Mode"
AIRASCAL	P1540260AAAAAAAAAAAAAAAA01264200000000.PDS	260/9260	AMSU - A	Special Case: L1A Product Input	[5.4]	Special Case: APID 260/9260 AMSU-A1 Science Data Packets - Staring Mode Packet 2; substituted for APID 262 when instrument is in "Staring Mode"

AIR10SCC	P1540261AAAAAAAAAAAAAAAA01264200000000.PDS	261/ 9261	AMSU - A	L1A Product Input	0.4	AMSU-A1 Science Full-Scan #1 Packets APID 261/9261: AMSU-A1 Science Data Packets collected during one full scan of the instruments operating in Full-Scan Mode
AIR10SCI	P1540262AAAAAAAAAAAAAAAA01264200000000.PDS	262/ 9262	AMSU - A	L1A Product Input	0.4	AMSU-A1 Science Full-Scan #2 Packets APID 262/9262: AMSU-A1 Science Data Packets collected during one full scan of the instruments operating in Full-Scan Mode
AIR20XNM	P1540288AAAAAAAAAAAAAAAA01264200000000.PDS	288/ 9288	AMSU - A	Special Case: L1A Product Input	[1.1]	Special Case: APID 288/9288 AMSU-A2 Science Data Packets - No Mode
AIR20XSM	P1540289AAAAAAAAAAAAAAAA01264200000000.PDS	289/ 9289	AMSU - A	Special Case: L1A Product Input	[0.2]	Special Case: APID 289/9289 AMSU-A2 Science Data Packets - Staring Mode
AIR20SCI	P1540290AAAAAAAAAAAAAAAA01264200000000.PDS	290/ 9290	AMSU - A	L1A Product Input	0.2	APID 290/9290 AMSU-A2 Science Data Packets collected during one full scan of the instruments operating in Full- Scan Mode
AIRB0SCI	P1540404AAAAAAAAAAAAAAAA01264200000000.PDS	404/ 9404	AIRS	L1A Product Input	624.9	AIRS Scene Packets APID 404/9404: Each packet in this collection contains ground footprint data collected by the AIRS instrument for one footprint position. There are 90 of these packets for each scan of the AIRS instrument.

AIRB0CAL	P1540405AAAAAAAAAAAAAAAA01264200000000.PDS	405/ 9405	AIRS	L1A Product Input	6.9	AIRS Spacelook Packets APID 405/9405
AIRB0CAH	P1540406AAAAAAAAAAAAAAAA01264200000000.PDS	406/ 9406	AIRS	L1A Product Input	6.9	AIRS Blackbody Packets APID 406/9406
AIRB0CAP	P1540407AAAAAAAAAAAAAAAA01264200000000.PDS	407/ 9407	AIRS	L1A Product Input	6.9	AIRS Spectral/ Photometric Packets APID 407/9407
AIRH1ENC	P1540414AAAAAAAAAAAAAAAA01264200000000.PDS	414/ 9414	AIRS	L1A Product Input	6.9	AIRS STD HR ENG #1 Packets APID 414/9414
AIRH2ENC	P1540415AAAAAAAAAAAAAAAA01264200000000.PDS	415/ 9415	AIRS	L1A Product Input	6.9	AIRS STD HR ENG #2 Packets APID 415/9415
AIRH1ENG	P1540416AAAAAAAAAAAAAAAA01264200000000.PDS	416/ 9416	AIRS	Special Case: L1A Product Input	[6.9]	Special Case: AIRS Flex HR ENG #2 Packets APID 416/9416; substituted for APID 414 when instrument is commanded to produce flexible engineering data
AIRH2ENG	P1540417AAAAAAAAAAAAAAAA01264200000000.PDS	417/ 9417	AIRS	Special Case: L1A Product Input	[6.9]	Special Case: AIRS Flex HR ENG #2 Packets APID 417/9417; substituted for APID 415 when instrument is commanded to produce flexible engineering data
AVI3_ANH	gblav.1998-09-12.T18Z.PGrbF03.anc	2203, 2213, 2223, 2233 & 2243	L2 Dynamic Ancillary Input	328.0	Aviation forecast from model; 2203, 2213, 2223, 2233 & 2243: 3-hour aviation forecast for 18Z-hour, 00Z-hour, 06Z- hour, 12Z-hour, 18Z-hour, respectively, cycle time on day prior to day in which granule starts	

AVI6_ANH	gblav.1998-09-12.T18Z.PGrbF06.anc	2206, 2216, 2226, 2236 & 2246	L2 Dynamic Ancillary Input	328.0	Aviation forecast from model; 2206, 2216, 2226, 2236 & 2246: 6-hour aviation forecast for same model as 2203, 2213, 2223, 2233 & 2243, respectively
AVI9_ANH	gblav.1998-09-12.T18Z.PGrbF09.anc	2209, 2219, 2229, 2239 & 2249	L2 Dynamic Ancillary Input	328.0	Aviation forecast from model; 2209, 2219, 2229, 2239 & 2249: 9-hour aviation forecast for same model as 2203, 2213, 2223, 2233 & 2243, respectively
PREPQCH	L2.gdas1.980913.T00Z.BufPREPda.anc	6400	RaObs RaObs PGE Dynamic Ancillary Input	12.0	NOAA Radiosonde Observations

Appendix C-3. AIRS Static Ancillary Inputs

ESDT Short Name	Sample File Name (Local Granule ID)	PCF LID	Instr.	Usage	File Size (MB)	Description
AIRXADCM	L1A.decom_map_hsb.v1.1.0.anc	4001		L1A Ancillary Input	0.04	Decom Map
AIRIARAN	L1A.eng_sumry_fds.v1.0.0.anc	4011	AIRS	L1A Ancillary Input	0.03	Limits for selected AIRS engineering parameters
AIRXACRV	L1A.tlm_calcurve_amsu.v1.1.1.anc	4009		L1A Ancillary Input	0.05	Calibration conversion data numbers ranges
AIRXAPLY	L1A.tlm_polyconv_amsu.v1.1.0.anc	4010		L1A Ancillary Input	0.01	Polynomial conversion constants
AIRXARYL	L1A.tlm_rylim_airs.v2.0.0.anc	4005		L1A Ancillary Input	0.60	Red & Yellow Limits
AIRXAGEO	L1A.geolocation.v2.4.0.anc	4006		L1A Ancillary Input	0.01	Geolocation Parameters
AIRHBPAR	L1B.HSB_AncMain.v2.0.0.anc	3601	HSB	L1B Ancillary Input	0.01	HSB calibration parameters
AIRHBSLC	L1B.HSB_SLCorr.v1.0.0.anc	3602	HSB	L1B Ancillary Input	0.03	HSB sidelobe correction matrices
AIRHBSLI	L1B.HSB_SLInterp.v2.0.0.anc	3604	HSB	L1B Ancillary Input	0.01	HSB cold sidelobe interpolation arrays

AIRABPAR	L1B.AMSU_AncMain.v2.0.0.anc	3501	AMSU-A	L1B Ancillary Input	0.01	AMSU-A calibration parameters
AIRABSLC	L1B.AMSU_SLCorr.v1.0.0.anc	3502	AMSU-A	L1B Ancillary Input	0.04	AMSU-A sidelobe correction matrices
AIRABSLI	L1B.AMSU_SLInterp.v2.0.0.anc	3504	AMSU-A	L1B Ancillary Input	0.04	AMSU-A cold sidelobe interpolation arrays
AIRXBPAR	L1B.config_file1.v1.2.0.anc	3005	AIRS	L1B Ancillary Input	0.06	L1B Calibration parameters
AIRIBFRQ	L1B.airs_freq.v1.0.0.anc	3006	AIRS	L1B Ancillary Input	0.02	AIRS frequency list
AIRIBFPM	L1B.airs_focal_plane_map.v1.1.0.anc	3007	AIRS	L1B Ancillary Input	0.001	AIRS focal plane map
AIRIBSFF	L1B.spectral_feature.v1.2.0.anc	3010	AIRS	L1B Ancillary Input	0.17	AIRS spectral features
AIRIBNLC	L1B.non_linear_corr.v1.1.0.anc	3011	AIRS	L1B Ancillary Input	0.09	AIRS Non-linearity correction coefficients
AIRIBPOL	L1B.polarization_corr.v1.1.0.anc	3012	AIRS	L1B Ancillary Input	0.04	AIRS polarization correction coefficients
AIRIBSVS	L1B.space_view_sel.v1.0.0.anc	3013	AIRS	L1B Ancillary Input	0.0007	AIRS space view selection parameters
AIRIBPOP	L1B.popcorn_corr.v1.0.0.anc	3014	AIRS	L1B Ancillary Input	0.01	AIRS popcorn correction parameters

AIRIBQPR	L1B.airs_qa.v1.3.0.anc	3015	AIRS	L1B Ancillary Input	0.3	AIRS QA parameters
AIRVBCPR	L1B.vis_param.v1.0.0.anc	3009	AIRS	L1B Ancillary Input	0.003	VIS calibration parameters
AIRVBQPR	L1B.vis_qa.v1.1.0.anc	3016	AIRS	L1B Ancillary Input	0.01	VIS QA parameters
AIRI2TMC	L2b.trcoef.airs.v5.1.0.anc	2001	AIRS	L2 Ancillary Input	36.9	AIRS IR Channel Transmittances
AIRA2TMC	L2.trcoef.amsu.v3.0.0.anc	2002	AMSU-A	L2 Ancillary Input	0.13	AMSU-A Transmittances
AIRH2TMC	L2.trcoef.hsb.v3.0.0.anc	2003	HSB	L2 Ancillary Input	0.05	HSB Transmittances
AIRX2CLI	L2.uars_clim.v1.0.1.anc	2005		L2 Ancillary Input	1.2	Climatology to set initial guess profiles
AIRX2AAC	L2h.angle_adj_coef.v2.1.4.anc	2006		L2 Ancillary Input	40.9	Angle Correction Coefficients
AIRX2AEI	L2.F.error_est.v1.0.0.anc	2007		L2 Ancillary Input	0.01	Ancillary error estimate inputs
AIRX2ABT	L2h.brtemp_tuning_coef.v2.0.0.anc	2008		L2 Ancillary Input	29.4	BRTemp Tuning Coefficients
AIRI2SRD	L2.airs_solar_rad.v5.1.0.anc	2009	AIRS	L2 Ancillary Input	0.06	Solar radiances

AIRX2CAV	L2.cloud_avg.v2.0.0.anc	2010		L2 Ancillary Input	0.24	Parameters determining channel averaging vs. extrapolation
AIRM2MEC	L2.M.ecof_705.v1.0.0.anc	2011		L2 Ancillary Input	0.004	MW emissivity coefficients
AIRM2MCM	L2.M.cov100av.v1.0.0.anc	2012		L2 Ancillary Input	0.22	MW temperature profile covariance matrix
AIRH2AAW	L2.M.weight.hsb.v1.0.0.anc	2013	HSB	L2 Ancillary Input	0.003	HSB ASCII Weight
AIRI2CHP	L2.l.channel_prop.v5.1.2.anc	2014	AIRS	L1B AIRS & L2 Ancillary Input	0.21	AIRS Channel properties
AIRI2OLR	L2h.F.coef_olr.v1.0.0.anc	2015		L2 Ancillary Input	0.06	Outgoing longwave radiation coefficients
AIRX2ICW	L2.l.peak_wgt.v2.0.0.anc	2021		L2 Ancillary Input	0.17	FIRST cloud clearing weighting function sensitivities
AIRX2MAS	L2.masuda.v1.0.0.anc	2016		L2 Ancillary Input	0.06	Coefficients for Masuda model of ocean emissivities
AIRX2CTC	L2.l.cleartest_coef.v2.0.2.day.anc	2054 & 2055		L2 Ancillary Input	0.004	Coefficients to predict AIRS radiance from AMSU-A
AIRI2FRQ	L2.l.clr.regcoef.v1.0.1.anc	2056 & 2057		L2 Ancillary Input	1.1	Clear sky detection regression coefficients
AIRI2FEV	L2.l.eigvec_allang.solang.nf.v2.0.0.anc	2041 & 2042	AIRS	L2 Ancillary Input	6.6	FIRST retrieval first guess matrix of eigenvectors for nighttime footprints

AIRI2FRD	L2.l.rcoef.solang.v2.0.0.anc	2043 & 2044	AIRS	L2 Ancillary Input	0.6	FIRST first guess principal component mode regression coeff daytime footprints
AIRI2IFC	L2.l.freq.eigvec.v2.0.0.anc	2045	AIRS	L2 Ancillary Input	0.02	FIRST retrieval first guess eigenvectors AIRS channels list
AIRX2ANG	L2.l.ang_pc.v2.0.0.anc	2046		L2 Ancillary Input	7.9	Principle components for angle adjustment
AIRX2ICM	L2.l.airs_covmtx.v2.0.0.anc	2051		L2 Ancillary Input	0.6	FIRST physical retrieval covariance matrix for L2 parameters
AIRX2ITC	L2.l.freq.tmp.ret.v2.0.0.anc	2052	AIRS & AMSU-A	L2 Ancillary Input	0.001	FIRST retrieval temperature channel list for AIRS and AMSU-A
AIRX2IWC	L2.l.freq.h2o.ret.v2.0.0.anc	2053	AIRS & HSB	L2 Ancillary Input	0.001	FIRST retrieval water channel list for AIRS and HSB
AIRX2NLD	L2_DEFAULTS100.v2.0.4.anc	2061		L2 Ancillary Input	0.01	Namelist giving default values for L2 parameters
AIRV2PRM	L2.vis_nir.v2.0.0.anc	2065	AIRS	L2 Ancillary Input	0.001	V/NIR parameters
AIRHBMLC	BR.L1B.HSB_limb.v1.0.0.anc	3703	HSB	HSB Daily Browse PGE Ancillary Input	0.01	HSB L1B browse limb correction
AIRHBCTB	BR.L1B.HSB_hdf_color_tbl.v1.0.0.anc	3705	HSB	HSB Daily Browse PGE Ancillary Input	0.001	HSB L1B browse color table
AIRABMLN	BR.L1B.AMSU_limb_nosea.v1.0.0.anc	3701	AMSU-A	AMSU Daily Browse PGE Ancillary Input	0.03	AMSU L1B browse limb correction - no sea

AIRABMLS	BR.L1B.AMSU_limb_sea.v1.0.0.anc	3702	AMSU-A	AMSU Daily Browse PGE Ancillary Input	0.029	AMSU L1B browse limb correction - sea
AIRABCTB	BR.L1B.AMSU_hdf_color_tbl.v1.0.0.anc	3704	AMSU-A	AMSU Daily Browse PGE Ancillary Input	0.001	AMSU L1B browse color table
AIRIBCTB	BR.L1B.AIRS_hdf_color_tbl.v1.0.0.anc	3705	AIRS	AIRS Daily Browse PGE Ancillary Input	0.001	AIRS L1B browse color table
AIRX2BCTB	BR.L2.RET_hdf_color_tbl.v1.0.0.anc	2082	AIRS	AIRS L2 Retrieved Product Daily Browse PGE Ancillary Input	0.001	AIRS L2 Retrieved Product browse color table
AIRI2BCTB	BR.L2.CC_hdf_color_tbl.v1.0.0.anc	2081	AIRS	AIRS L2 Retrieved Product Daily Browse PGE Ancillary Input	0.001	AIRS L2 Cloud-Cleared Radiance browse color table
AIRVBVIM	AVHRR_NDVI_Apr11to20_1993.v1.0.0.anc	2301 - 2312	AIRS	L2 Ancillary Input	700	Static monthly mean multiday surface visible maps, for use when no dynamic AIRVBVIM available